PePLink Balance Series v3.7

PePLink Balance 30/200/300/700

User Manual

Rev. 1.3, 9/2006

COPYRIGHT & TRADEMARKS
Specifications are subject to change without notice. Copyright © 1999-2006 PePLink Ltd. All Rights Reserved. PePLink and the PePLink logo are trademarks of PePLink Ltd. Other brands or products mentioned may be trademarks or registered trademarks of their respective owners.

Table of Contents

1 INTRODUCTION AND SCOPE 4
2 GLOSSARY 4
3 PRODUCT FEATURES 5
3.1 SUPPORTED NETWORK FEATURES 5
3.2 OTHER SUPPORTED FEATURES 5
4 PACKAGE CONTENTS 6
4.1 PEPLINK BALANCE 30 6
4.2 PEPLINK BALANCE 200 6
4.3 PEPLINK BALANCE 300 6
4.4 PEPLINK BALANCE 700 6
5 PEPLINK BALANCE OVERVIEW 7
5.1 PEPLINK BALANCE 200 7
5.2 PEPLINK BALANCE 30 AND 300 9
5.3 PEPLINK BALANCE 700 11
6 INSTALLATION 13
6.1 CONNECTING THE NETWORK WITH PEPLINK BALANCE 13
6.2 CONFIGURING COMPUTERS ON THE LAN 15
7 BASIC CONFIGURATION 17
7.1 CONNECTING TO WEB ADMINISTRATION INTERFACE 17
7.2 CONFIGURATION WITH SETUP WIZARD 18
7.3 USING ADVANCED SETUP 18
8 CONFIGURATION OF LAN INTERFACE(S) 19
9 DROP-IN MODE 21
10 CONFIGURATION OF WAN INTERFACE(S) 24
10.1 DHCP CONNECTION 24
10.2 STATIC IP CONNECTION 26
10.3 PPPOE CONNECTION 29
10.4 GRE CONNECTION 31
10.5 DYNAMIC DNS SETTINGS 35
10.6 WAN HEALTH CHECK 36
11 FIREWALL CONFIGURATION 38
12 MANAGEMENT OF OUTBOUND TRAFFIC TO WAN 42
12.1 OUTBOUND TRAFFIC POLICY 42
12.2 FINE TUNING LOAD DISTRIBUTION FOR INDIVIDUAL SERVICES 43
12.3 CONFIGURATION OF PERSISTENT SERVICES 45
13 MANAGEMENT OF INBOUND ACCESS FROM WAN 46
13.1 DEFINITION OF SERVERS ON LAN 46
13.2 DEFINITION OF SERVICES 47
13.3 DEFINITION OF PORTING FORWARDING 51
13.4 DEFINITION OF DNS RECORDS 54
14 CONFIGURATION OF DMZ SERVERS 64
15 MISCELLANEOUS SETTINGS 65
15.1 HIGH AVAILABILITY 65
15.2 QUALITY OF SERVICE 67

15.3 TIME SERVER 67
15.4 SNMP SETUP 68
15.5 EMAIL NOTIFICATION 70
15.6 REMOTE SYSTEM LOG 70
16 ADMINISTRATIVE SETTINGS 71
17 FIRMWARE 72
17.1 FIRMWARE UPGRADE 72
17.2 FLASH MANAGEMENT 73
18 REMOTE MANAGEMENT 74
18.1 MANAGEMENT SERVERS 74
18.2 REPORTING SERVER 75
19 INFORMATION 77
19.1 SYSTEM 77
19.2 LINK USAGE STATUS 78
19.3 ACTIVE SESSIONS 78
19.4 LOG 79
20 UTILITIES 80
20.1 SAVING AND LOADING CONFIGURATIONS 80
20.2 PING TEST 81
20.3 TRACEROUTE TEST 82
APPENDIX A. RESTORATION OF FACTORY DEFAULTS 83
APPENDIX B. ROUTING UNDER DHCP, STATIC IP, AND PPPOE 84
B.1 ROUTING VIA NETWORK ADDRESS TRANSLATION (NAT) 84
B.2 ROUTING VIA IP FORWARDING 84
APPENDIX C. CASE STUDIES 85
C.1 PERFORMANCE OPTIMIZATION 85
C.2 MAINTAINING THE SAME IP ADDRESS THROUGHOUT A SESSION 86
C.3 BYPASSING THE FIREWALL TO ACCESS HOSTS ON LAN 88
C.4 INBOUND ACCESS RESTRICTION 89
C.5 OUTBOUND ACCESS RESTRICTION 90
APPENDIX D. TROUBLESHOOTING 91
APPENDIX E. PRODUCT SPECIFICATIONS 93
E.1 PEPLINK BALANCE 200 93
E.2 PEPLINK BALANCE 30 AND PEPLINK BALANCE 300 94
E.3 PEPLINK BALANCE 700 95

1 Introduction and Scope

The PePLink Balance series provides link aggregation and load balancing across up to seven WAN connections.

The PePLink Balance 30 provides a feature set that is suitable for Small Office / Home Office (SO/HO) environments.

The PePLink Balance 200, 300, and 700, with a suite of advanced enterprise-class features, make ideal single-box solutions for medium- to large-sized businesses environments, as well as allow service providers to provision highly available multi-network service.

This manual applies to the following PePLink Balance products:

- PePLink Balance 30 (firmware version v3.7.x)
- PePLink Balance 200 (firmware version v3.7.x)
- PePLink Balance 300 (firmware version v3.7.x)
- PePLink Balance 700 (firmware version v3.7.x)

The manual presents how to set up PePLink Balance, and provides a collection of case studies involving advanced features of PePLink Balance.

2 Glossary

The following terms, acronyms, and abbreviations are frequently used in this manual:

Term	Definition
DHCP	Dynamic Host Configuration Protocol
DMZ	Demilitarized Zone
DNS	Domain Name System
GRE	Generic Routing Encapsulation
HTTP	Hyper-Text Transfer Protocol
ICMP	Internet Control Message Protocol
IP	Internet Protocol
LAN	Local Area Network
MAC Address	Media Access Control Address
MTU	Maximum Transmission Unit
MSS	Maximum Segment Size
NAT	Network Address Translation
PPPoE	Point to Point Protocol over Ethernet
SNMP	Simple Network Management Protocol
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
VRRP	Virtual Router Redundancy Protocol
WAN	Wide Area Network

3 Product Features

PePLink Balance Series products enable all LAN users to share broadband Internet links, and provide advanced features to enhance Internet access.

The following is the list of supported features:

3.1 Supported Network Features

3.1.1 WAN

- Multiple WAN Connection (DHCP, PPPoE, Static IP Address, or GRE)
- 10/100/1000 Mbps Connection in Full/Half Duplex
- Drop-in / transparent bridging
- DMZ setting
- Network Address Translation (NAT)
- PPTP packet pass through
- Multiple static IP addresses per WAN Connection
- MAC address clone
- Customizable MTU and MSS values
- WAN connection health check
- Dynamic DNS (Supported service providers: changeip.com, dyndns.org, no-ip.org)

3.1.2 LAN

- DHCP server on LAN
- Static routing rules

3.1.3 Firewall

- Outbound (LAN to WAN) firewall rules
- Inbound (WAN to LAN) firewall rules per WAN connection
- Specification of DMZ hosts

3.1.4 Inbound and Outbound Traffic Management

- Link load distribution per TCP/UDP service
- Persistent routing for specified destination IP addresses per TCP/UDP service
- TCP/UDP traffic redirection to dedicated LAN server(s)
- LAN server load distribution per TCP/UDP service
- Inbound link load balancing by means of DNS **(available only with PePLink Balance 200, 300, and 700)**

3.2 Other Supported Features

- Easy-to-use web-based administration interface
- HTTP and HTTPS support for Web Administration Interface
- Configurable web administration port and administrator password
- Firmware upgrades, configuration backups, Ping, and Traceroute via Web Administration Interface
- Remote web based configuration (via WAN and LAN interfaces)
- Remote reporting to PePLink Balance reporting server **(available only with PePLink Balance 200, 300, and 700)**
- Hardware High Availability via VRRP **(available only with PePLink Balance 200, 300, and 700)**

- Quality of Service for Voice over IP and Secure Web **(available only with PePLink Balance 200, 300, and 700)**
- Time server synchronization
- SNMP
- Email notification

4 Package Contents

The contents of PePLink Balance product packages are as follows:

4.1 PePLink Balance 30

- PePLink Balance 30
- Power adapter
- Information slip
- CD containing this user manual

4.2 PePLink Balance 200

- PePLink Balance 200
- Power adapter
- Information slip
- CD containing this user manual

4.3 PePLink Balance 300

- PePLink Balance 300
- Power adapter
- Information slip
- CD containing this user manual

4.4 PePLink Balance 700

- PePLink Balance 700
- Power cord
- Information slip
- CD containing this user manual

5 PePLink Balance Overview

5.1 PePLink Balance 200

5.1.1 Front Panel Appearance

5.1.2 LED Indicators

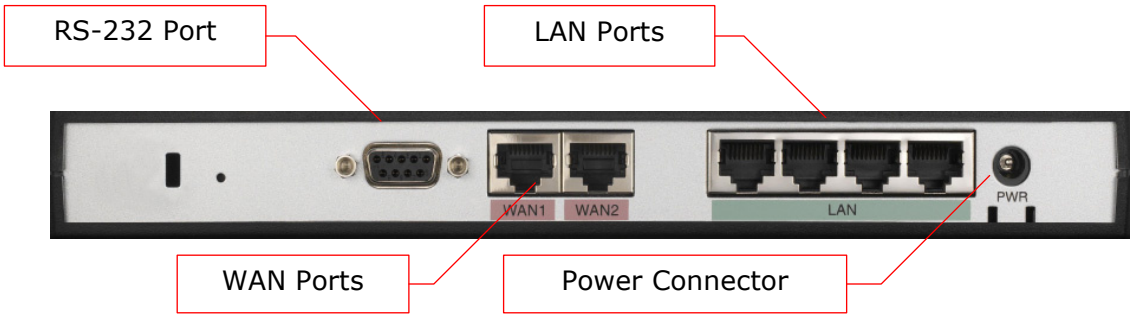
The statuses indicated by the Front Panel LEDs are as follows:

Power and Status Indicators	
Power	OFF – Power off Green – Power on
Status	OFF – System initializing Red – Booting up or busy Orange – Power on self test Green – Ready

LAN Indicators	
Activity	OFF – Port is not connected Green – Port is connected Blinking – Port is transferring data
10/100	OFF – 10Mbps Orange – 100Mbps

WAN Indicators	
Activity	OFF – Port is not connected Green – Port is connected Blinking – Port is transferring data
10/100	OFF – 10Mbps Orange – 100Mbps

5.1.3 Rear Panel Appearance

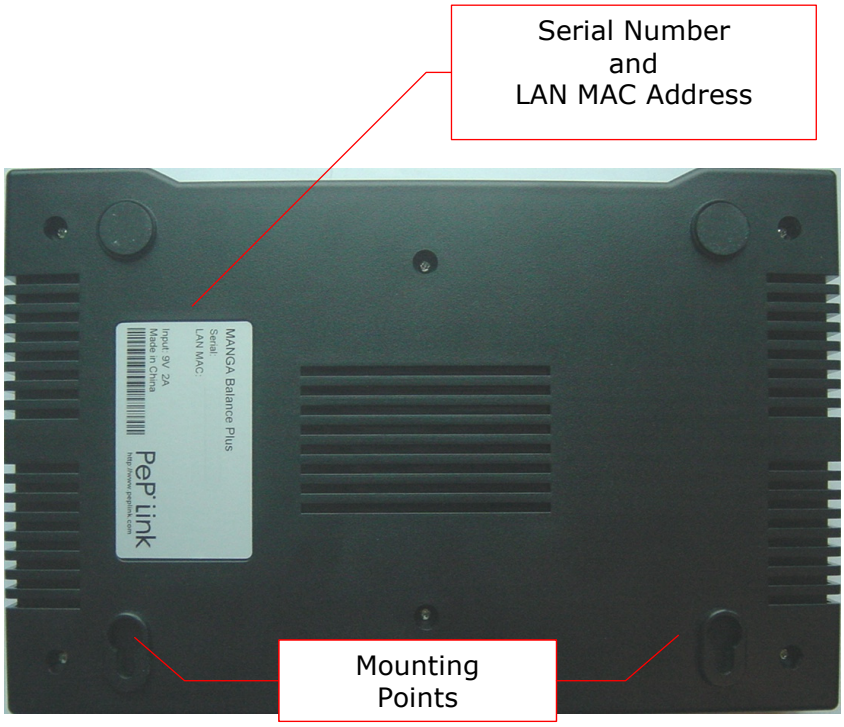


5.1.4 Connector Ports

The connector ports on the rear panel are as follows:

Connector Ports	
RS-232 Port	Reserved for engineering use
WAN Ports	Supports up to two 10/100BaseT WAN connections, typically connected to broadband modems
LAN Ports	Supports up to four 10/100BaseT LAN connections, typically connected to client PCs
Power Connector	DC 9V power input from supplied power adaptor

5.1.5 Unit Base Appearance



5.2 PePLink Balance 30 and 300

5.2.1 Front Panel Appearance

5.2.2 LED Indicators

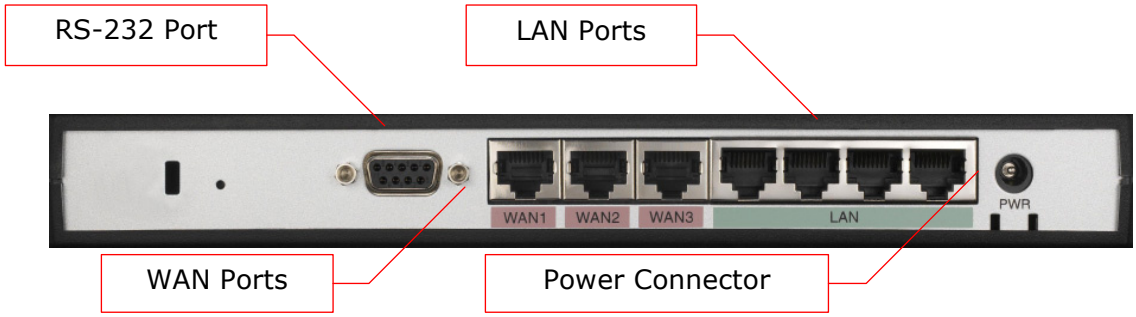
The statuses indicated by the Front Panel LEDs are as follows:

Power and Status Indicators	
Power	OFF – Power off Green – Power on
Status	OFF – System initializing Red – Booting up or busy Orange – Power on self test Green – Ready state

LAN Indicators	
Activity	OFF – Port is not connected Green – Port is connected Blinking – Port is transferring data
10/100	OFF – 10Mbps Orange – 100Mbps

WAN Indicators	
Activity	OFF – Port is not connected Green – Port is connected Blinking – Port is transferring data
10/100	OFF – 10Mbps Orange – 100Mbps

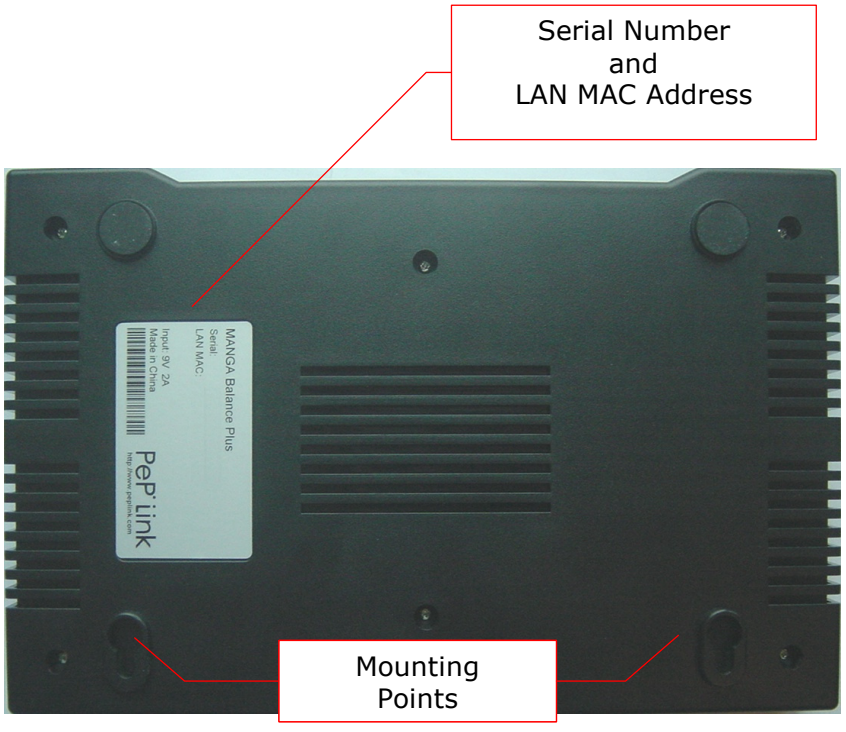
5.2.3 Rear Panel Appearance



5.2.4 Connector Ports

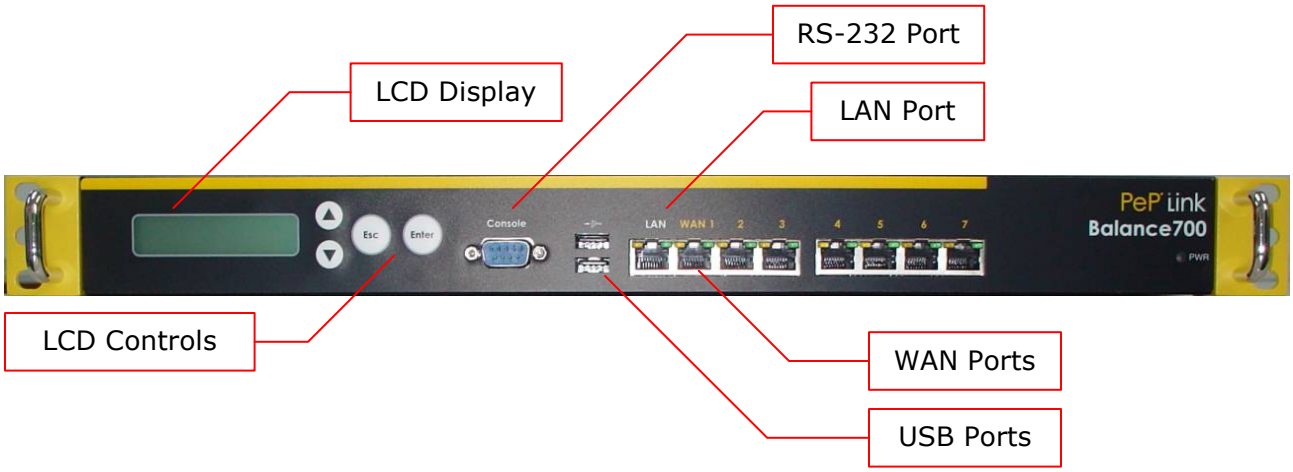
Connector Ports	
RS-232 Port	Reserved for engineering use
WAN Ports	Supports up to three 10/100BaseT WAN connections, typically connected to broadband modems
LAN Ports	Supports up to four 10/100BaseT LAN connections, typically connected to client PCs
Power Connector	DC 9V power input from supplied power adaptor

5.2.5 Unit Base Appearance



5.3 PePLink Balance 700

5.3.1 Front Panel Appearance



Status indicated in the Front Panel is as follows:

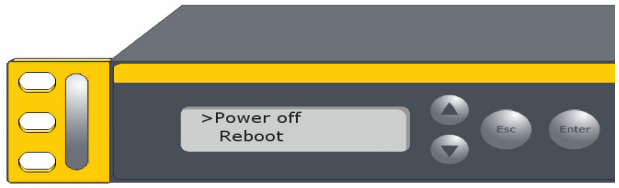
LED Indicator	
Power	OFF – Power off ON (Green) – Power on

RS-232 & USB Ports	
RS-232 Port	Reserved for Engineering Use
USB Ports	Reserved for Engineering Use

LAN Port and WAN Ports 1 to 3 (Gigabit Ethernet)	
Green LED	ON – 1000 Mbps OFF – 100/10 Mbps
Yellow LED	Solid – Port is connected without traffic Blinking – Data is transferring OFF – Port is not connected
Note:	They are auto MDI/MDI-X ports

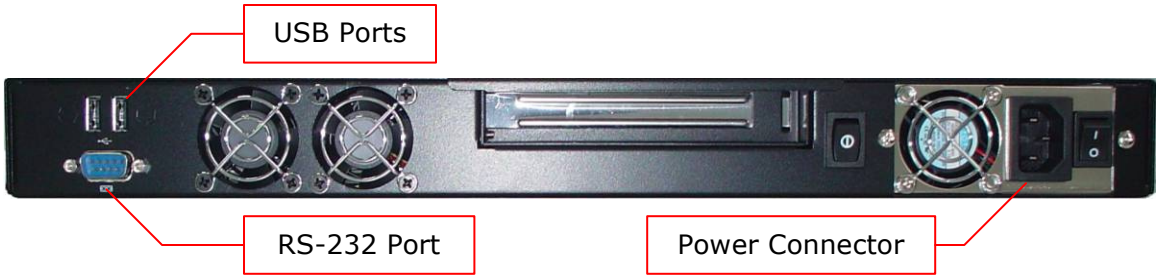
WAN Ports 4 to 7 (Fast Ethernet)	
Green LED	ON – 100 Mbps OFF – 10 Mbps
Yellow LED	Solid – Port is connected without traffic Blinking – Data is transferring OFF – Port is not connected
Note:	They are MDI ports

5.3.2 LCD Display Menu



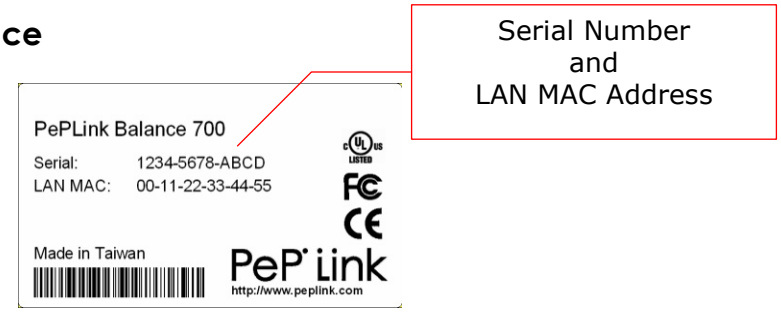
> System Status
    > System
        > Firmware ver (shows firmware version)
        > Serial number (shows serial number)
        > System time (shows current time)
        > System up time (shows up time since server reboot)
        > CPU load (shows current CPU loading, 0-100%)
        > LAN
            > Status (shows LAN port physical status)
            > IP address (shows LAN IP address)
            > Subnet mask (shows LAN subnet mask)
    > Link status (shows Connected/Disconnected, IP address list)
        > WAN1
        > WAN2
        > …
        > WAN7
    > Link usage
        > Throughput in (shows transfer rate in Kbps)
            > WAN1
            > WAN2
            > …
            > WAN7
        > Throughput out (shows transfer rate in Kbps)
        > WAN1
        > WAN2
        > …
        > WAN7
    > Data Transfer'd (shows volume transferred since last reboot in MB)
        > WAN1
        > WAN2
        > …
        > WAN7
> Maintenance
    > Power off > Power off? (Yes/No) (powers off unit)
    > Reboot > Reboot? (Yes/No) (reboots unit)
    > Factory default > Factory default? (Yes/No) (restores factory defaults)
> LAN config
    > Port speed (shows port speed: Auto, 10baseT-FD,
        > LAN 10baseT-HD, 100baseTx-FD,
        > WAN1 100baseTx-HD, 1000baseTx-FD)
    > WAN2
    > …
    > WAN7

5.3.3 Rear Panel Appearance



Connector Ports	
RS-232 Port	Reserved for engineering use
USB Ports	Reserved for engineering use
Power Connector	AC input 110/220V

5.3.4 Unit Label Appearance



6 Installation

6.1 Connecting the Network with PePLink Balance

6.1.1 Preparation

Before installing PePLink Balance, please prepare the following:

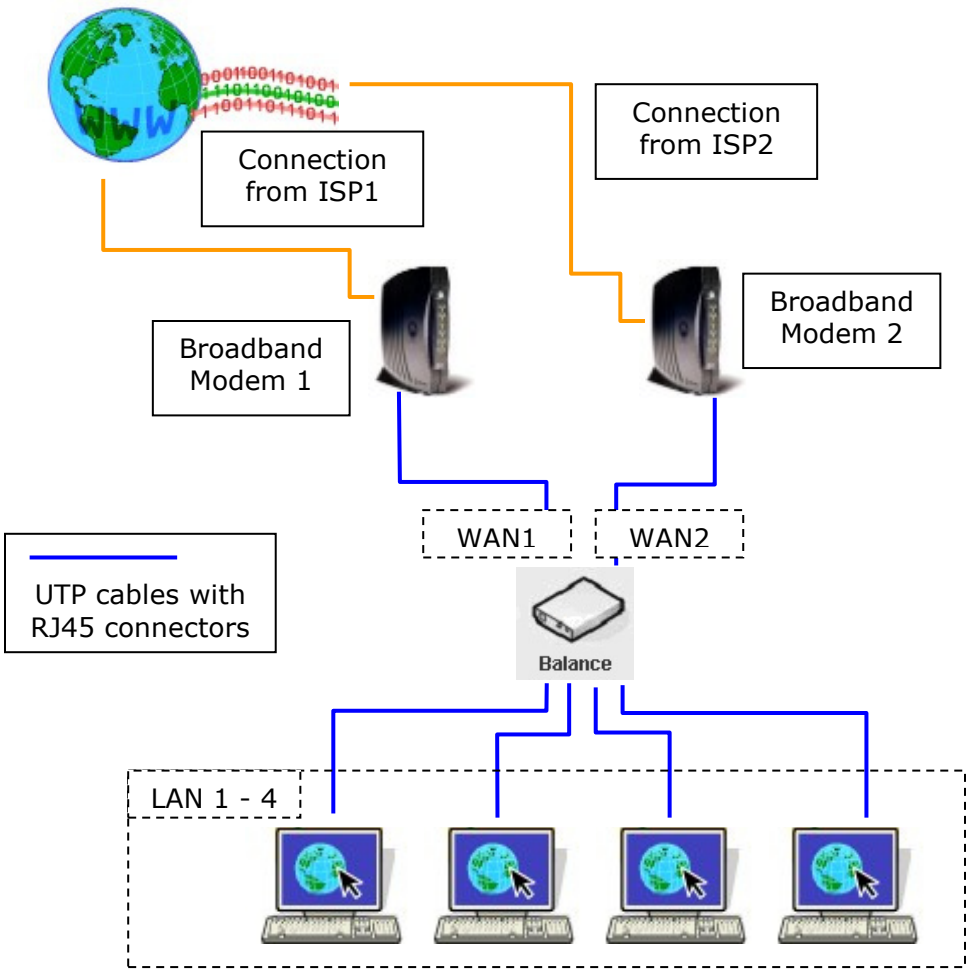
- At least one Internet/WAN access account
- For each network connection, one 10/100BaseT UTP cable with RJ45 connectors, or one 1000BaseT Cat5E UTP cable for the Gigabit ports on the Balance 700.
- A computer with TCP/IP network protocol and a web browser installed (Supported browsers include Microsoft Internet Explorer 5 or above, Firefox 1.0, and Mozilla.)

6.1.2 Constructing the Network

At a high level, construct the network according to the following steps:

1. With a network cable, connect a computer to one of the LAN ports on the PePLink Balance. For PePLink Balance 30, 200, and 300, repeat with different cables for up to 4 computers to be connected.
2. With another network cable, connect the WAN/broadband modem and one of the WAN ports on the PePLink Balance. Repeat using different cables to connect up to 3, 2, 3 or 7 WAN/broadband links with the PePLink Balance 30, 200, 300 and 700, respectively.
3. For PePLink Balance 30, 200, and 300, connect the provided power adapter to the power connector, and then plug in the power adapter at a power outlet. For PePLink Balance 700, connect the provided power cord to the AC power port, and then plug in the cord at a power outlet.

The following figure schematically illustrates the configuration that results:



6.1.3 Configuring the Network Environment

To ensure that PePLink Balance works properly in the LAN environment, and can access the Internet via the WAN connections, please refer to the following setup procedures:

- PC Configuration on the LAN

  Section 6.2, **Configuring Computers on the LAN**

- LAN Configuration

  For basic configuration, please refer to Section 7, **Basic Configuration**.

  Section 8, **Configuration of LAN Interface(s)** covers advanced configuration.

- WAN Configuration

  For basic configuration, refer to Section 7, **Basic Configuration**.

  Section 10, **Configuration of WAN Interface(s)** covers advanced configuration.

6.2 Configuring Computers on the LAN

The simplest way to setup the Local Area Network (LAN) is to enable the DHCP Server functionality of PePLink Balance. With this setting, PePLink Balance will automatically provide a suitable IP Address (and related information) to each computer connected to its LAN interface. (Please refer to Section 8, **Configuration of LAN Interface(s)**, for further details on the DHCP Server Settings.)

The following steps configure a computer on the LAN to use the DHCP Server functionality provided by PePLink Balance:

6.2.1 Windows 95/98/ME/2000 DHCP Client Configuration

1. Select ***Start Menu > Settings > Control Panel > Internet Options***.
2. Select the ***Connection*** tab, and click the ***Setup*** button.
3. Select the option:

   I want to set up my Internet connection manually, or I want to connect through a local area network (LAN)

4. Click ***Next***.
5. Select the option:

   I connect through a local area network (LAN)

6. Click ***Next***.
7. On the subsequent Local area network Internet Configuration screen, ensure that all of the boxes are **unchecked**.
8. When prompted with the following:

   Do you want to set up an Internet mail account now?

   Select the option ***No***.

9. Click ***Finish*** to close the Internet Connection Wizard.

6.2.2 Windows XP DHCP Client Configuration

1. Select Start ***Menu > Control Panel > Network and Internet Connections***.
2. Select ***Set up or change your Internet Connection***.
3. Select the ***Connection*** tab, and click the ***Setup*** button.
4. At the ***Location Information*** pop-up menu, select ***Cancel***.
5. At the ***New Connection Wizard*** screen, click ***Next***.
6. Select ***Connect to the Internet*** and click ***Next***.
7. Select ***Set up my connection manually*** and click ***Next***.
8. Select the following checkbox:

   Connect using a broadband connection that is always on
9. Click ***Next***.
10. Click ***Finish*** to close the New Connection Wizard.

6.2.3 Mac DHCP Client Configuration

1. Open TCP/IP Control Panel.
2. From the ***Connect via*** pop-up menu, select ***Ethernet***.
3. Select ***Using DHCP Server*** from the ***Configure*** pop-up menu.
   (The ***DHCP Client ID*** field can be left blank.)
4. Save the settings and close the TCP/IP Control Panel.

6.2.4 UNIX DHCP Client Configuration

Depending on the flavor of UNIX, the procedure may vary. The following steps are for Red Hat Enterprise Linux 3:

1. Login to the system as ***root***.
2. At the command prompt, type `netconfig`.
3. When prompted with the following:

   Would you like to set up networking?

   Respond with ***Yes***.
4. When prompted with the following:

   Please enter the IP configuration for this machine...

   Select the option:

   Use dynamic IP configuration (BOOTP/DHCP)
5. Select ***OK***.

7 Basic Configuration

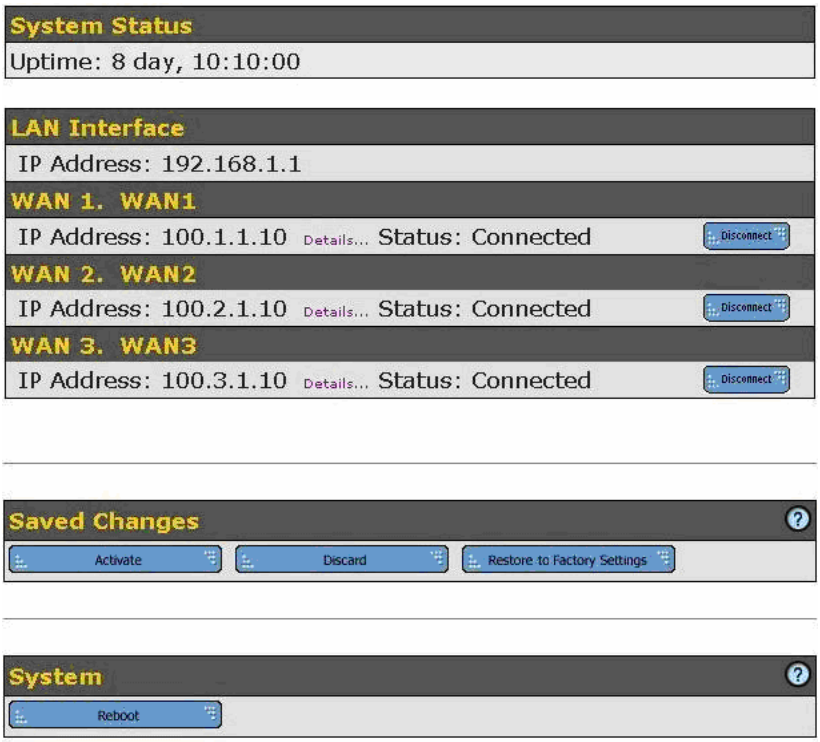
7.1 Connecting to Web Administration Interface

1. Start a web browser on a computer connected through LAN with PePLink Balance.
2. To connect to Web Administration Interface of PePLink Balance, enter the following LAN IP address in the address field of the web browser:

   `http://192.168.1.1`

   (The default LAN IP address for PePLink Balance is 192.168.1.1)
3. When prompted for ***User name*** and ***Password*** to access the Web Administration Interface, enter ***User name*** as `admin` and ***Password*** as `admin` to proceed.

   (The default password `admin` can be changed via Web Administration Interface.)
4. After successful login, the main page of Web Administration Interface is displayed:

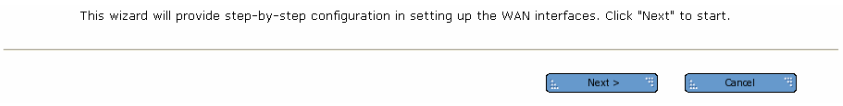


Important Note
Configuration changes (e.g. WAN, LAN, Admin settings, etc.) take effect after clicking the ***Activate*** button on the main page. The ***Activate*** button causes the changes to be saved and applied.

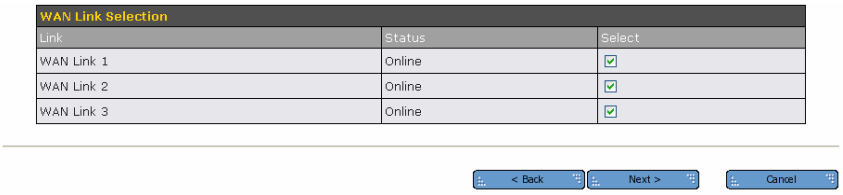
7.2 Configuration with Setup Wizard

The Setup Wizard of PePLink Balance simplifies the task of configuring WAN connection(s) by guiding the configuration process step by step.

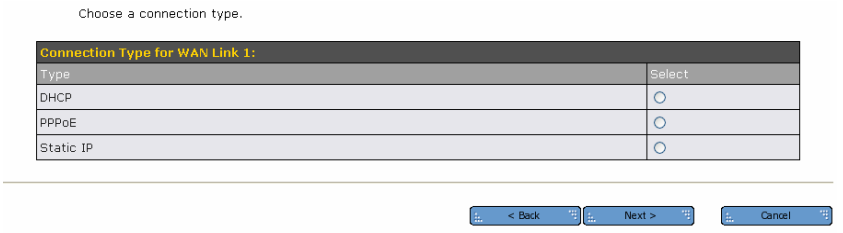
To begin, click ***Setup Wizard*** after connecting to Web Administration Interface.



Click on the appropriate check box(es) to select the WAN connection(s) to be configured:



Select the connection type from the following screen:



Depending on the selection of connection type, further configuration may be needed. For example, PPPoE and Static IP require additional settings for the selected WAN port. Please refer to Section 10, **Configuration of WAN Interface(s)**, for details on setting up DHCP, Static IP, PPPoE, and GRE.

After finishing the last step in the Setup Wizard, please click ***Activate*** on the main page to effect the configuration changes.

7.3 Using Advanced Setup

Advanced WAN settings can be configured from the ***Advanced Setup*** menu.

WAN connections can be configured by entering the corresponding WAN connection information from ***Advanced Setup > Interfaces > WAN***:

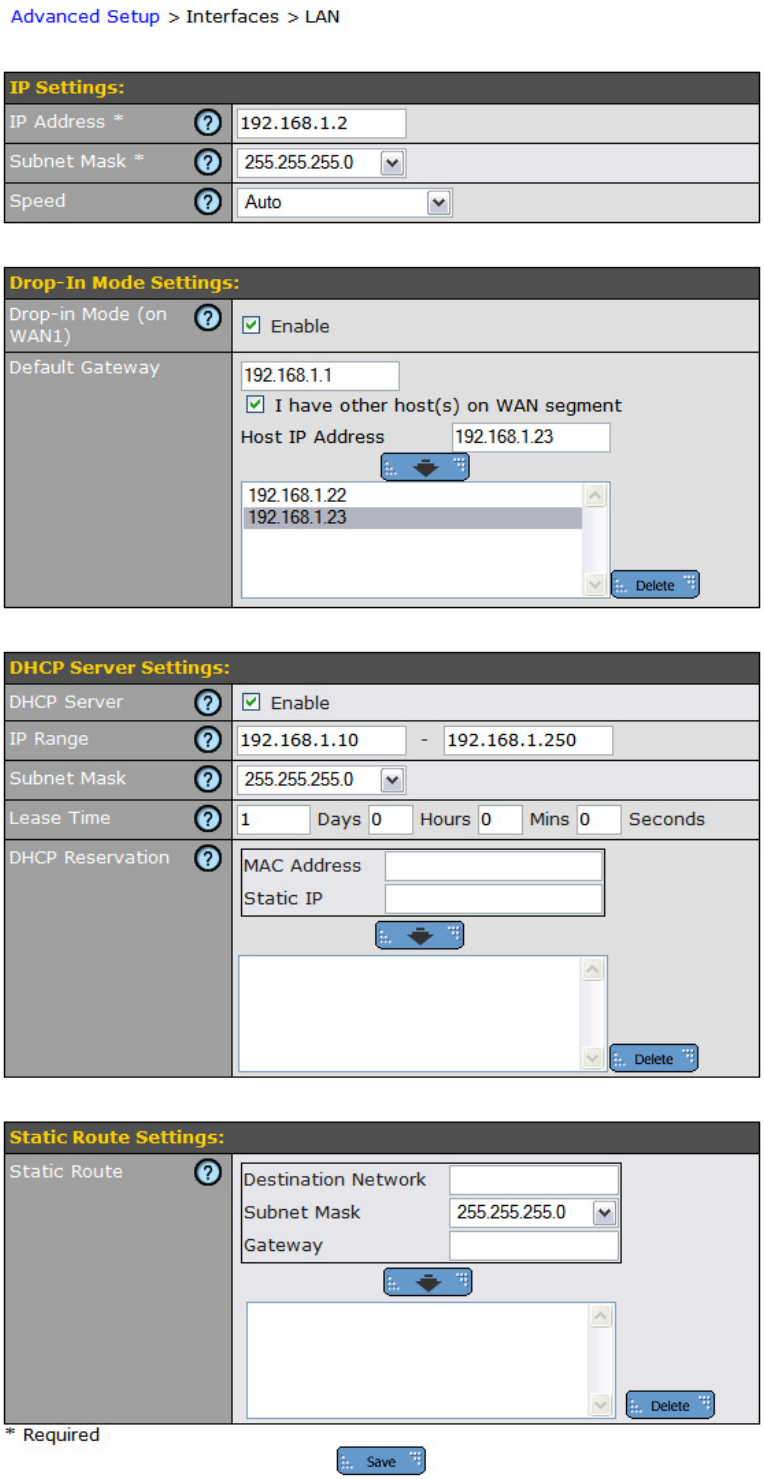
WAN	Type	Routing Mode	Connection
1. WAN1	DHCP	NAT	Always-on
2. WAN2	Static IP	IP Forwarding	Always-on
3. WAN3	PPPoE	NAT	Always-on

Tip

Please refer to Section 10, **Configuration of WAN Interface(s)**, for details on setting up DHCP, Static IP, PPPoE, and GRE.

8 Configuration of LAN Interface(s)

The LAN Interface settings are located in ***Advanced Setup > Interfaces > LAN***:



LAN Settings	
IP Address & Subnet Mask	The IP address of PePLink Balance on LAN
Speed	The speed of the LAN Ethernet Port. By default, the appropriate data speed is automatically detected by PePLink Balance. In the event of synchronization issues, the port speed can be manually specified to circumvent the issues.

Drop-in Mode Settings	
IP Address & Subnet Mask	Drop-in Mode eases the installation of PePLink Balance on a live network between the existing Firewall and Router, such that no configuration changes are required on existing equipment. Please refer to Section 0, , for details.

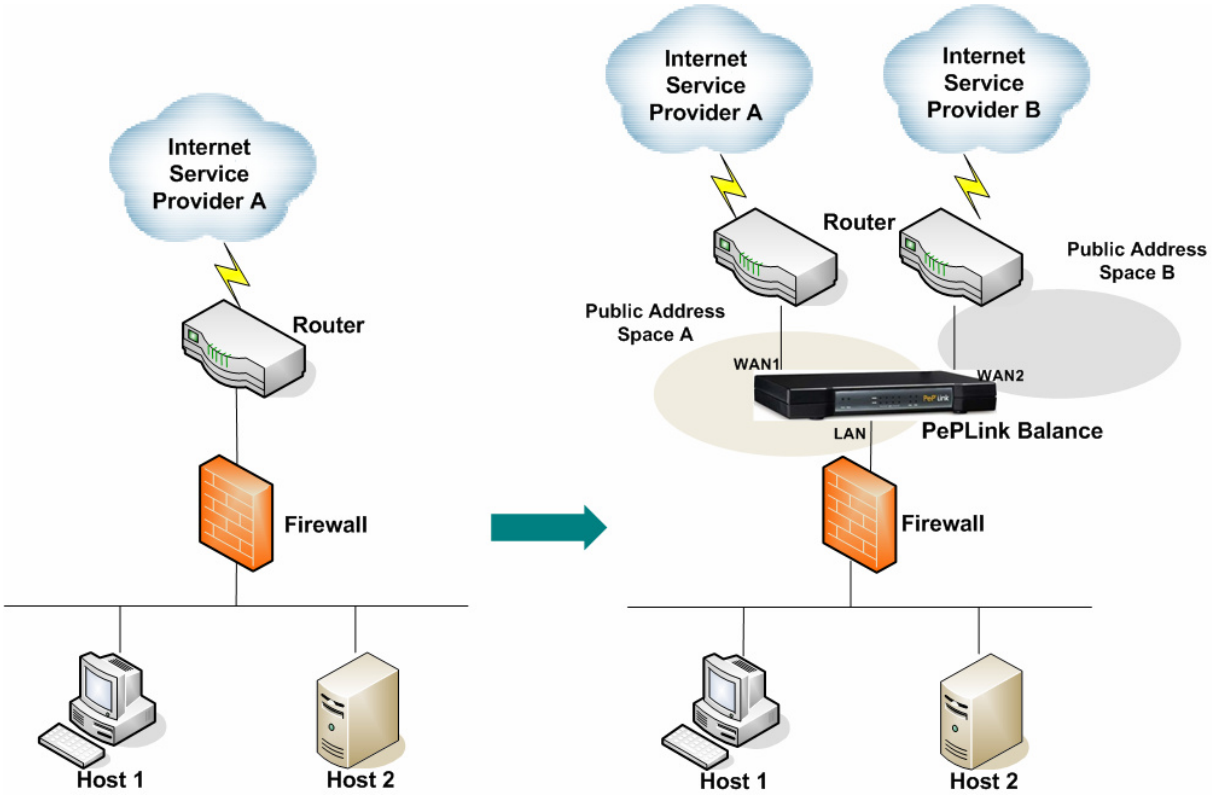
DHCP Server Settings	
Enable DHCP	When this setting is enabled, the DHCP server of PePLink Balance automatically assigns an IP address to each computer that is connected via LAN and configured to obtain an IP address via DHCP. PePLink Balance's DHCP server prevents IP address collision on LAN.
IP Range & Subnet Mask	This setting allocates a range of IP address that will be assigned to LAN computers by the DHCP server of PePLink Balance.
Lease Time	This setting specifies the length of time throughout which an IP address of a DHCP client remains valid. Upon expiration of the Lease Time, the assigned IP address will no longer be valid and the renewal of the IP address assignment will be required.
DHCP Reservation	This setting reserves the assignment of fixed IP addresses for a list of computers on the LAN. The computers to be assigned fixed IP addresses on the LAN are identified by their MAC addresses. The fixed IP address assignment is displayed as a cross-referenced list between the computers' MAC addresses and fixed IP addresses. MAC addresses must be in the format of `00:AA:BB:CC:DD:EE`

Static Route Settings	
Static Route	This table is for defining static routing rules. A static routing rule consists of the network address, subnet mask, and gateway address. The address and subnet masks values are in the format of `w.x.y.z` After entering the corresponding values for a routing rule, click the ***Down Arrow*** button to add it to the table. To remove an existing static routing rule, select the rule from the list and click the ***Delete*** button.

9 Drop-in Mode

Drop-in Mode (or transparent bridging mode) eases the installation of PePLink Balance on a live network between the firewall and router, such that changes to the settings of existing equipment are not required.

The following diagram illustrates:

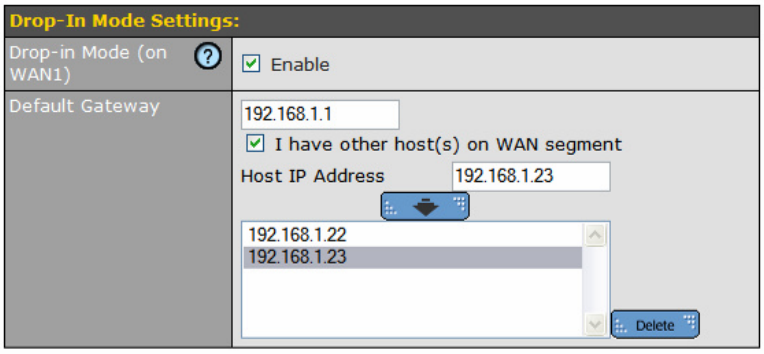


When Drop-in Mode is enabled, the LAN ports and the WAN1 port are bridged.

When operating in Drop-in Mode, PePLink Balance forwards the traffic between the LAN hosts and the router for WAN1 without performing any IP address translation. Hosts on the LAN will not notice any change in the IP addresses of the hosts on WAN1, and vice-versa. However, although the IP addresses on all of the forwarded packets remain the same, PePLink Balance inserts its own MAC address in place of the original. As a result, MAC address changes will be noticed by hosts on both the LAN and the WAN. Further details will subsequently follow.

After successfully setting up PePLink Balance as part of the network via Drop-in Mode, a PePLink Balance 200 unit will accommodate one additional WAN connection; PePLink Balance 30 and 300 will accommodate two additional WAN connections; PePLink Balance 700 will further accommodate six additional WAN connections.

To enable Drop-in mode, perform the following steps from:
Advanced Setup > Interfaces > LAN:



1. Check the ***Enable*** box under Drop-in Mode. (After checking the ***Enable*** box, most network settings for WAN1 will be hidden from Web Administration Interface.)
2. Put the IP address of the WAN1 router in the ***Default Gateway*** field. Ensure that the IP subnet of the PePLink Balance is the same as that of Firewall's WAN port and the Router's LAN port.
3. If hosts other than the router exist on the WAN segment of PePLink Balance, check the ***I have other host(s) on WAN segment*** box, enter the IP address(es) of the host(s), and then click the down-arrow to add the hosts.

Important Note

After the installation of PePLink Balance in Drop-in Mode, the hosts on both sides of PePLink Balance will notice a change in MAC addresses. (The installation of PePLink Balance in Drop-in Mode will effect no change in IP addresses.)

More specifically, LAN hosts find that IP packets from WAN hosts report the MAC address of PePLink Balance. Similarly, WAN hosts find that the MAC address of PePLink Balance is reported by the IP packets from LAN hosts.

From a practical perspective, the mentioned change in MAC addresses is communicated, briefly after the installation of PePLink Balance, to the WAN1 router, the firewall, and hosts on the LAN via broadcast ARP packets.

The potential issue exists where the broadcast ARP packets do not reach some hosts and/or routers. Under such circumstances, the ARP table entries of the affected equipment would not be up to date and, therefore, the affected equipment would not be able to communicate.

Flushing the ARP table of the affected equipment will likely overcome this issue. Alternatively, it may also be practical to wait for the ARP table entries to refresh, or to reboot the affected equipment. (ARP table entries in Windows are refreshed every 5 seconds; other types of equipment may require greater lengths of time to refresh.)

10 Configuration of WAN Interface(s)

The WAN interface settings are located in ***Advanced Setup > Interfaces > WAN***.

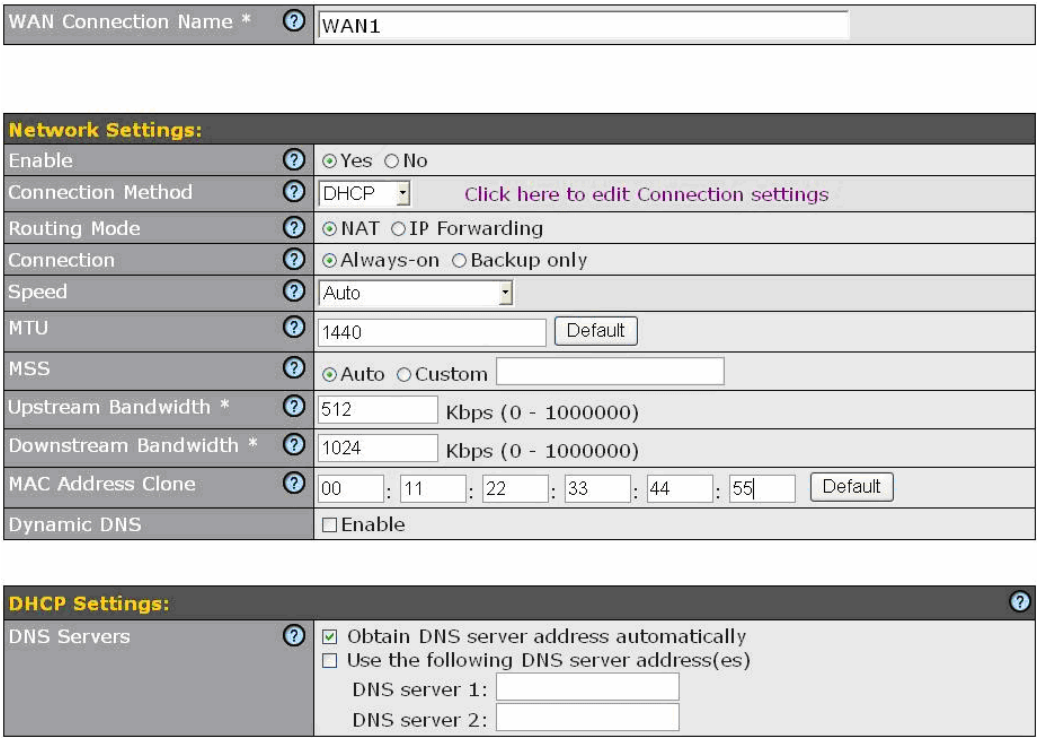
There are four possible connection methods:

- DHCP
- Static IP
- PPPoE
- GRE

The connection method and details are determined by, and can be obtained from, the ISP.

10.1 DHCP Connection

The DHCP connection method is suitable if the ISP provides an IP address automatically by DHCP (e.g. Cable, Metro Ethernet, etc.).



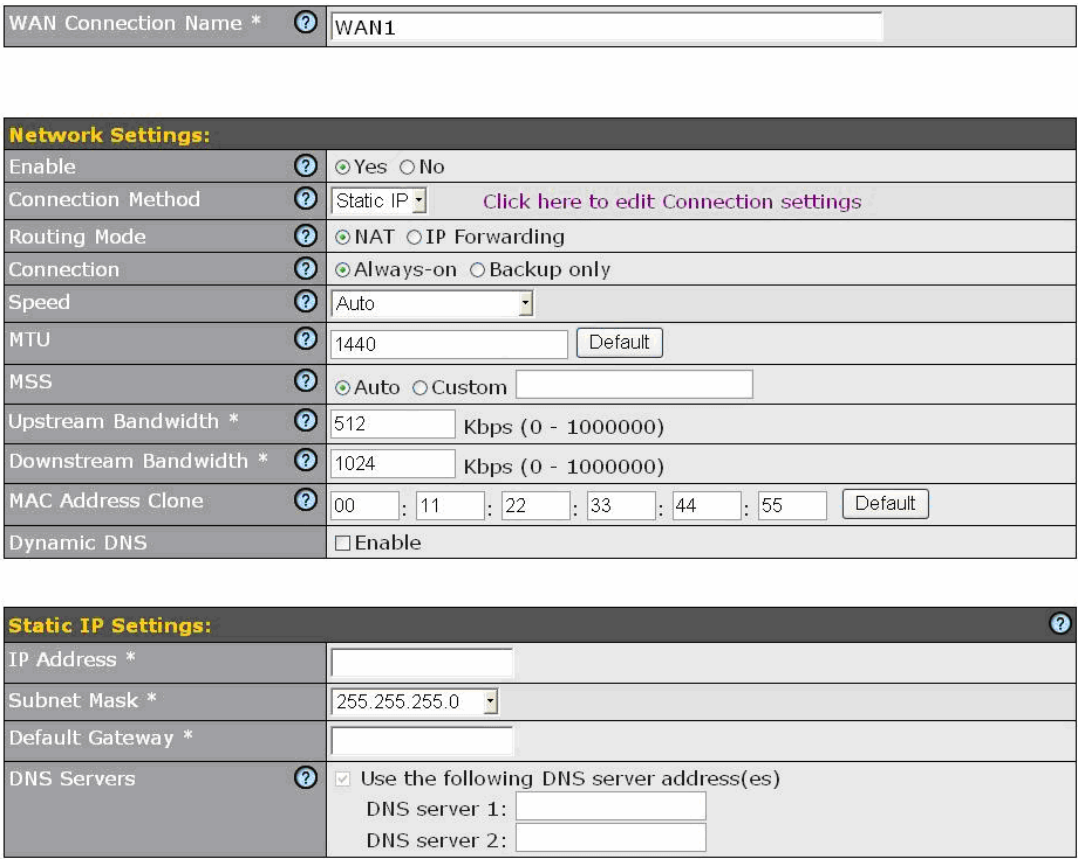
Network Settings for DHCP	
Routing Mode	This setting selects between routing via NAT and IP Forwarding. By default, Routing Mode is set to NAT. For further details, please refer to Appendix B, **Routing under DHCP, Static IP, and PPPoE**.

Network Settings for DHCP	
Connection	This setting specifies the utilization of the WAN link. The selection of ***Always-on*** results in the WAN link to be used whenever it is available. If ***Backup only*** is selected, the WAN link is used only in the absence of available Always-on WAN link(s). The default and recommended value for Connection is ***Always-on***.
Speed	This setting specifies connection speed and duplex configurations. By default, Speed is set to ***Auto***.
MTU	This setting specifies the Maximum Transmission Unit. By default, MTU is set to 1440.
MSS	This setting should be configured based on the maximum payload size that the local system can handle. The MSS (Maximum Segment Size) is computed from the MTU minus 40 bytes for TCP over IPv4. By default, MSS is set to ***Auto***.
Upstream Bandwidth	This setting specifies the data bandwidth in the outbound direction from the LAN through the WAN interface.
Downstream Bandwidth	This setting specifies the data bandwidth in the inbound direction from the WAN interface to the LAN. The value of this setting is used as the default weight control value for outbound load balance.
MAC Address	This setting allows configuring a user-specified MAC address. Some service providers (e.g. cable providers) identify the clients' MAC addresses and require a client to always connect using the same MAC address. In such cases, use the MAC Address setting to change PePLink Balance's WAN interface MAC address to be the same as that of the original client PC. The default MAC Address value is a unique value assigned at the factory. In most cases, the default value suffices. Clicking the Default button restores MAC Address to the default value.

DNS Server Settings for DHCP	
DNS Servers	This setting specifies the DNS (Domain Name System) Servers to be used over the WAN link. Each WAN link has its own corresponding DNS Servers settings. Selecting ***Obtain DNS server address automatically*** results in the DNS Servers assigned by the WAN DHCP Server to be used for outbound DNS lookups over the WAN link. (The DNS Servers are typically assigned by the WAN DHCP Server to PePLink Balance at the same time as when PePLink is assigned the WAN IP address.) If ***Use the following DNS server address(es)*** is selected and values for ***DNS server 1*** and ***DNS server 2*** are manually entered, then the manually entered DNS server values will be used for outbound DNS lookups over the WAN link.

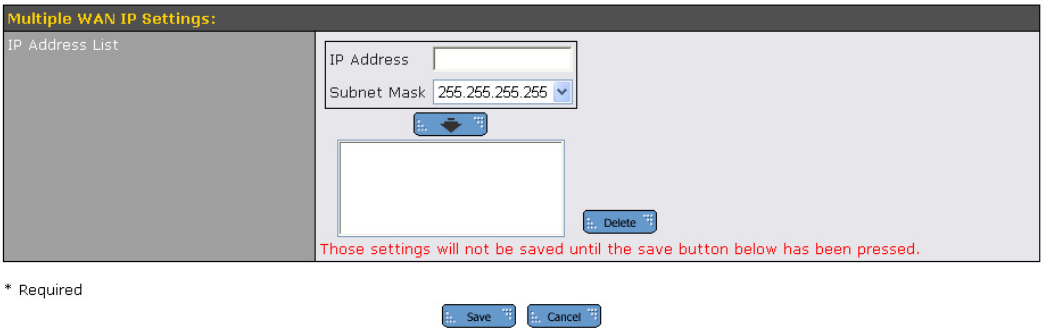
10.2 Static IP Connection

The Static IP connection method is suitable if the ISP provides a static IP address to connect directly.



Network Settings for Static IP	
Routing Mode	This setting selects between routing via NAT and IP Forwarding. By default, Routing Mode is set to NAT. For further details, please refer to Appendix B, **Routing under DHCP, Static IP, and PPPoE**.
Connection	This setting specifies the utilization of the WAN link. The selection of ***Always-on*** results in the WAN link to be used whenever it is available. If ***Backup only*** is selected, the WAN link is used only in the absence of available Always-on WAN link(s). The default and recommended value for Connection is ***Always-on***.
Speed	This setting specifies connection speed and duplex configurations. By default, Speed is set to ***Auto***.
MTU	This setting specifies the Maximum Transmission Unit. By default, MTU is set to 1440.

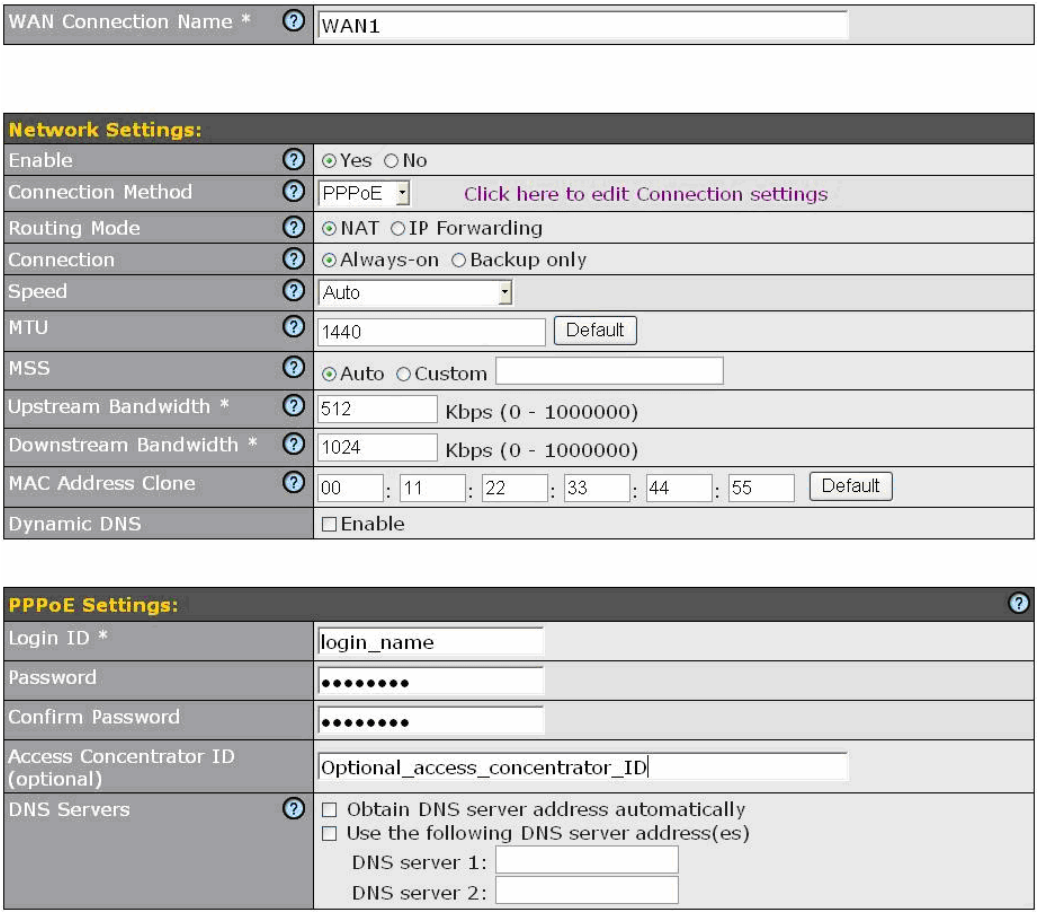
Network Settings for Static IP	
MSS	This setting should be configured based on the maximum payload size that the local system can handle. The MSS (Maximum Segment Size) is computed from the MTU minus 40 bytes for TCP over IPv4. By default, MSS is set to ***Auto***.
Upstream Bandwidth	This setting specifies the data bandwidth in the outbound direction from the LAN through the WAN interface.
Downstream Bandwidth	This setting specifies the data bandwidth in the inbound direction from the WAN interface to the LAN. The value of this setting is used as the default weight control value for outbound load balance.
MAC Address	This setting allows configuring a user-specified MAC address. Some service providers (e.g. cable providers) identify the clients' MAC addresses and require a client to always connect using the same MAC address. In such cases, use the MAC Address setting to change PePLink Balance's WAN interface MAC address to be the same as that of the original client PC. The default MAC Address value is a unique value assigned at the factory. In most cases, the default value suffices. Clicking the Default button restores MAC Address to the default value.
Static IP Settings	These settings specify the information required in order to communicate on the Internet via a fixed Internet IP address. The information is typically determined by and can be obtained from the ISP, and include the following: • IP Address • Subnet Mask • Default Gateway • DNS Server 1 • DNS Server 2



Multiple WAN IP Settings for Static IP	
IP Address List	The IP Address List represents the list of fixed Internet IP addresses assigned by the ISP, in the event that more than one Internet IP addresses are assigned. Enter the fixed Internet IP addresses and the corresponding subnet mask, and then click the ***Down Arrow*** button to add an entry to the IP Address List.

10.3 PPPoE Connection

The PPPoE connection method is suitable if the ISP provides a PPPoE account and password to connect via PPPoE.



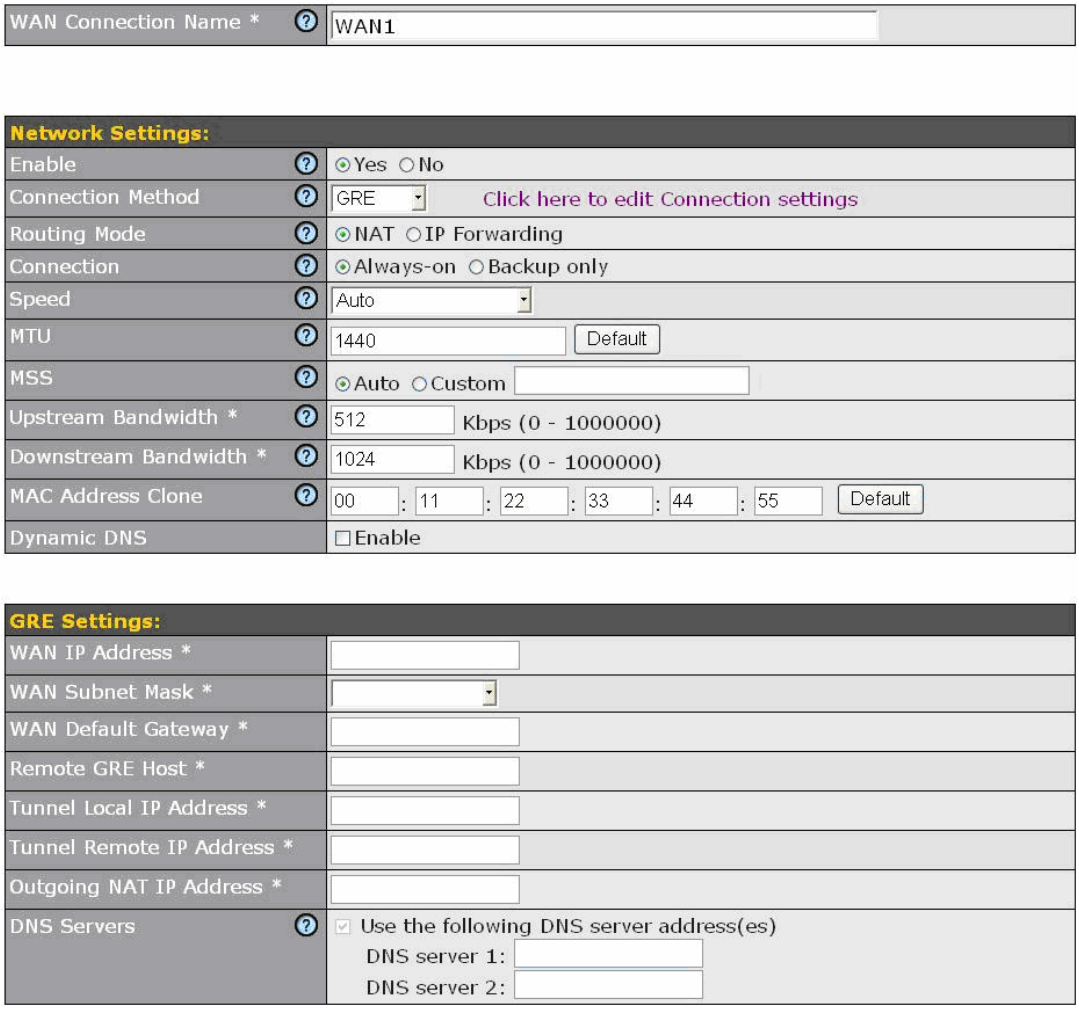
Network Settings for PPPoE	
Routing Mode	This setting selects between routing via NAT and IP Forwarding. By default, Routing Mode is set to NAT. For further details, please refer to Appendix B, **Routing under DHCP, Static IP, and PPPoE**.
Connection	This setting specifies the utilization of the WAN link. The selection of ***Always-on*** results in the WAN link to be used whenever it is available. If ***Backup only*** is selected, the WAN link is used only in the absence of available Always-on WAN link(s). The default and recommended value for Connection is ***Always-on***.
Speed	This setting specifies connection speed and duplex configurations. By default, Speed is set to ***Auto***.

Network Settings for PPPoE	
MTU	This setting specifies the Maximum Transmission Unit. By default, MTU is set to 1440.
MSS	This setting should be configured based on the maximum payload size that the local system can handle. The MSS (Maximum Segment Size) is computed from the MTU minus 40 bytes for TCP over IPv4. By default, MSS is set to ***Auto***.
Upstream Bandwidth	This setting specifies the data bandwidth in the outbound direction from the LAN through the WAN interface.
Downstream Bandwidth	This setting specifies the data bandwidth in the inbound direction from the WAN interface to the LAN. The value of this setting is used as the default weight control value for outbound load balance.
MAC Address	This setting allows configuring a user-specified MAC address. Some service providers (e.g. cable providers) identify the clients' MAC addresses and require a client to always connect using the same MAC address. In such cases, use the MAC Address setting to change PePLink Balance's WAN interface MAC address to be the same as that of the original client PC. The default MAC Address value is a unique value assigned at the factory. In most cases, the default value suffices. Clicking the Default button restores MAC Address to the default value.

PPPoE Settings	
Login ID and Password	These settings specify the information required in order to connect via PPPoE to the ISP. The information is typically determined by and can be obtained from the ISP, and include the following: • Login ID • Password
DNS Servers	This setting specifies the DNS (Domain Name System) Servers to be used over the WAN link. Each WAN link has its own corresponding DNS Servers settings. Selecting ***Obtain DNS server address automatically*** results in the DNS Servers assigned by the WAN DHCP Server to be used for outbound DNS lookups over the WAN link. (The DNS Servers are typically assigned by the WAN DHCP Server to PePLink Balance at the same time as when PePLink is assigned the WAN IP address.) If ***Use the following DNS server address(es)*** is selected and values for ***DNS server 1*** and ***DNS server 2*** are manually entered, then the manually entered DNS server values will be used for outbound DNS lookups over the WAN link.

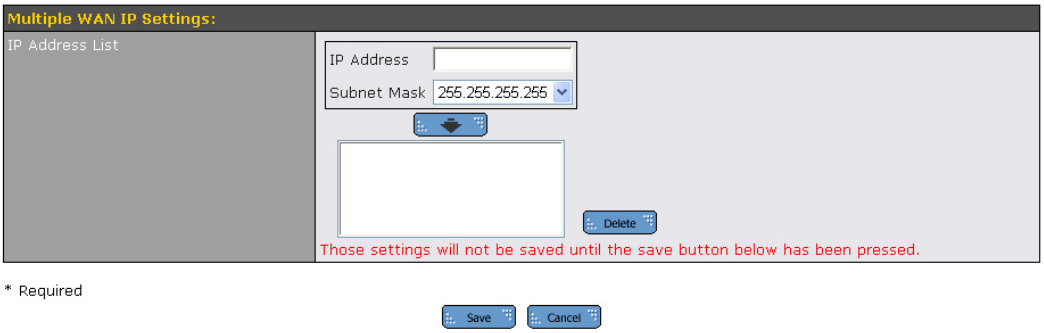
10.4 GRE Connection

The GRE connection method is suitable if the ISP provides GRE tunnel access through a private network to the Internet.



Network Settings for GRE	
Routing Mode	This setting selects between routing via NAT and IP Forwarding. By default, Routing Mode is set to NAT. For further details, please refer to the following sections: • Section 10.4.1, **Routing under GRE via Network Address Translation (NAT)** • Section 10.4.2, **Routing under GRE via IP Forwarding**
Connection	This setting specifies the utilization of the WAN link. The selection of ***Always-on*** results in the WAN link to be used whenever it is available. If ***Backup only*** is selected, the WAN link is used only in the absence of available Always-on WAN link(s). The default and recommended value for Connection is ***Always-on***.

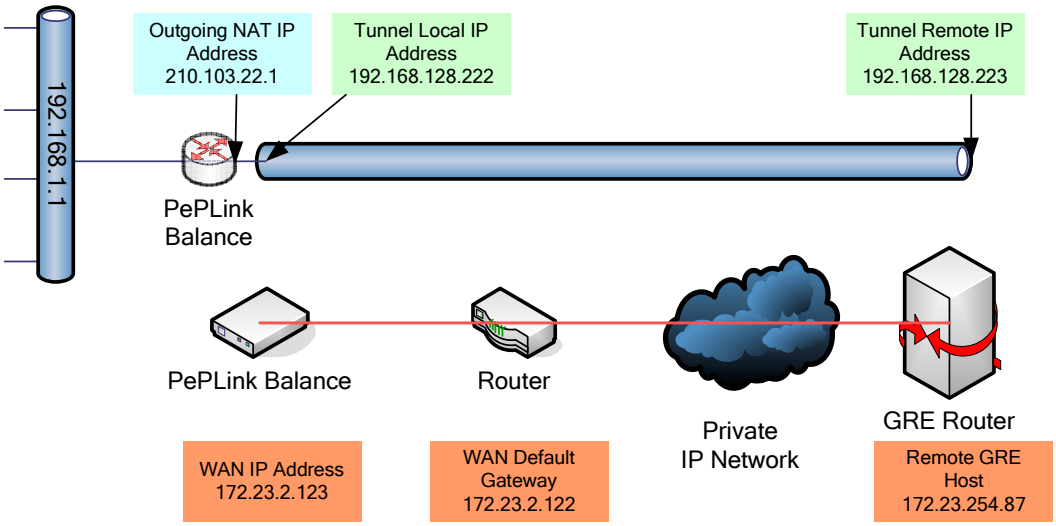
Network Settings for GRE	
Speed	This setting specifies connection speed and duplex configurations. By default, Speed is set to ***Auto***.
MTU	This setting specifies the Maximum Transmission Unit. By default, MTU is set to 1440.
MSS	This setting should be configured based on the maximum payload size that the local system can handle. The MSS (Maximum Segment Size) is computed from the MTU minus 40 bytes for TCP over IPv4. By default, MSS is set to ***Auto***.
Upstream Bandwidth	This setting specifies the data bandwidth in the outbound direction from the LAN through the WAN interface.
Downstream Bandwidth	This setting specifies the data bandwidth in the inbound direction from the WAN interface to the LAN. The value of this setting is used as the default weight control value for outbound load balance.
MAC Address	This setting allows configuring a user-specified MAC address. Some service providers (e.g. cable providers) identify the clients' MAC addresses and require a client to always connect using the same MAC address. In such cases, use the MAC Address setting to change PePLink Balance's WAN interface MAC address to be the same as that of the original client PC. The default MAC Address value is a unique value assigned at the factory. In most cases, the default value suffices. Clicking the Default button restores MAC Address to the default value.
GRE Settings	Please refer to the immediately following sections for further details: • Section 10.4.1, **Routing under GRE via Network Address Translation (NAT)** • Section 10.4.2, **Routing under GRE via IP Forwarding** The values for ***DNS server 1*** and ***DNS server 2*** are typically determined by, and can be obtained from, the ISP.



Multiple WAN IP Settings for GRE	
IP Address List	In the event that more than one Internet IP addresses are assigned to be routed via the GRE tunnel, the IP Address List represents the list of fixed Internet IP addresses assigned by the ISP. Enter the fixed Internet IP addresses and the corresponding subnet mask, and then click the ***Down Arrow*** button to add an entry to the IP Address List.

10.4.1 Routing under GRE via Network Address Translation (NAT)

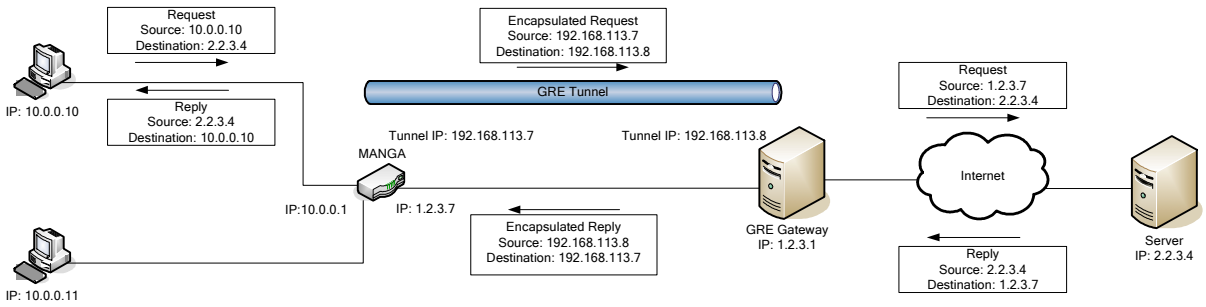
The following figure shows a typical scenario with PePLink Balance under the GRE connection mode and NAT routing mode:



In this scenario, the IP address settings are as follows:

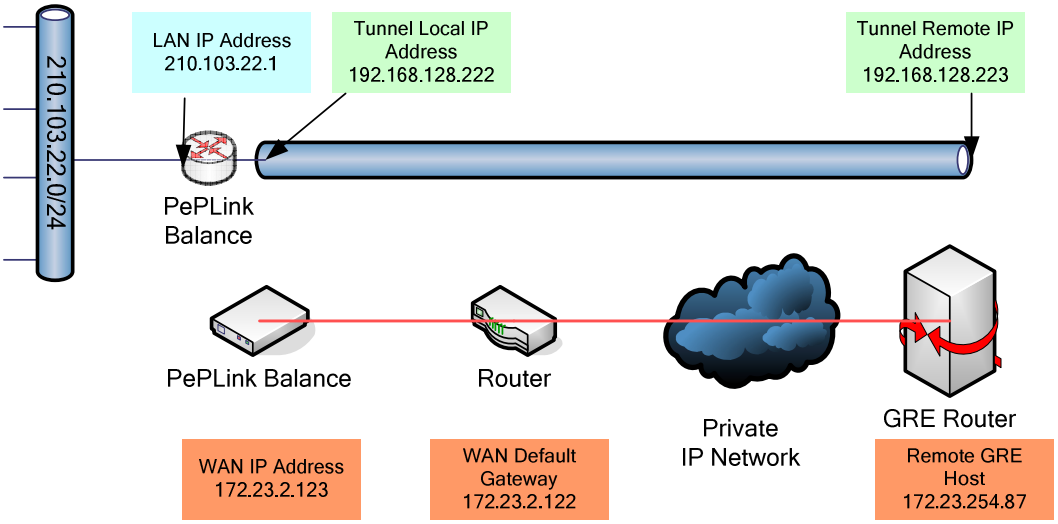
- WAN IP Address: 172.23.2.123
- Default Gateway: 172.23.2.122
- Remote GRE IP address: 172.23.254.87 (GRE router or host's IP address)
- Tunnel IP remote address: 192.168.128.223 (IP address of remote end of tunnel)
- Tunnel IP local address: 192.168.128.222 (IP address of local end of tunnel)
- Outgoing NAT IP address: 210.103.22.1 (This field is used for NAT routing mode only. For all outgoing traffic, the IP datagram will be sent via this IP address through the tunnel; as a result, the Outgoing NAT IP address is the public address that is seen by all external hosts on the WAN.)

The following figure shows the packet flow for PePLink Balance under GRE connection mode and NAT routing mode:



10.4.2 Routing under GRE via IP Forwarding

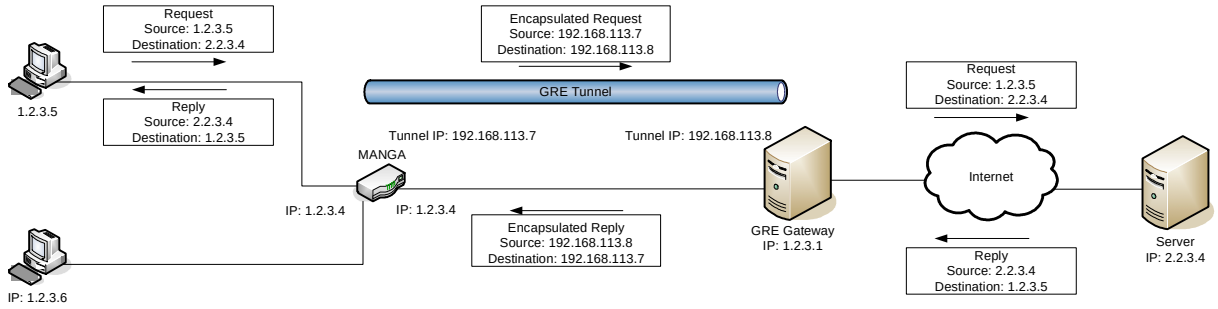
The following figure shows a typical scenario with PePLink Balance under the GRE connection mode and IP Forwarding routing mode:



In this scenario, the IP address settings are as follows:

- WAN IP Address: 172.23.2.123
- Default Gateway: 172.23.2.122
- Remote GRE IP address: 172.23.254.87 (the GRE router or host's IP address)
- Tunnel IP remote address: 192.168.128.223 (IP address of remote end of tunnel)
- Tunnel IP local address: 192.168.128.222 (IP address of local end of tunnel)
- LAN IP Address: 210.103.22.1

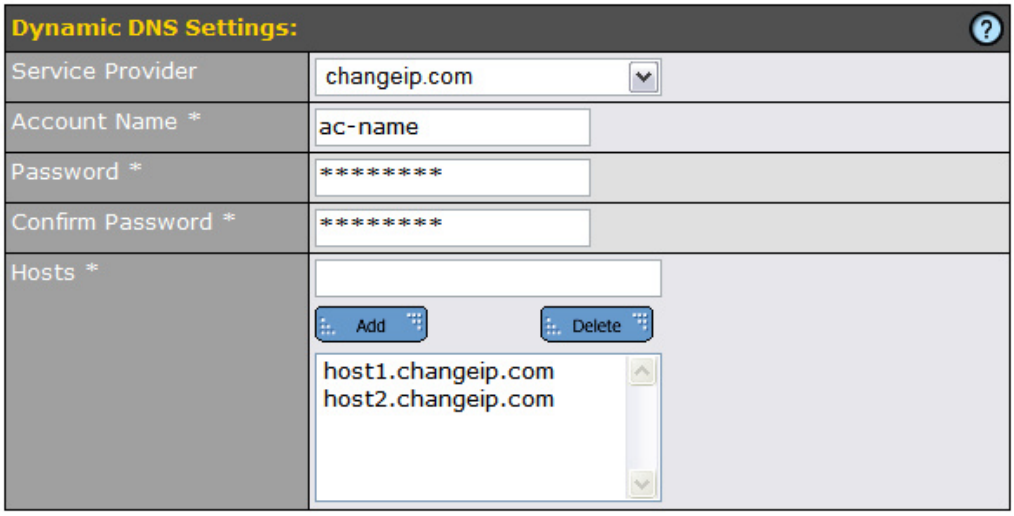
The following figure shows the packet flow for PePLink Balance under GRE connection mode and IP Forwarding routing mode:



10.5 Dynamic DNS Settings

PePLink Balance provides the functionality to register the domain name relationships to dynamic DNS service providers. Through registration with dynamic DNS service provider(s), the public Internet IP address(es) of each WAN connection can be associated with a list of domain name(s).

The settings for dynamic DNS service provider(s) and the association of hostname(s) are configured via ***Advanced Setup > Interfaces > WAN Setup***:



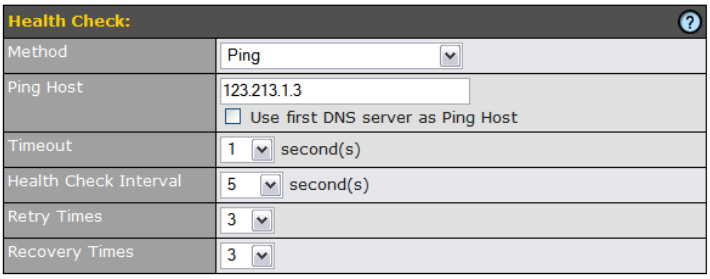
Dynamic DNS Settings	
Service Provider	This setting specifies the dynamic DNS service provider to be used for the WAN based on supported dynamic DNS service providers: • changeip.com • dyndns.org • no-ip.org If "Disabled" is selected, this feature will be disabled.
Account Name	This setting specifies the dynamic DNS service account name.
Password	This setting specifies the password for the dynamic DNS service.
Hosts	This setting specifies a list of hostnames to be associated with the public Internet IP address of the WAN connection.

Important Note
In order to use dynamic DNS services, appropriate hostname registration(s), as well as a valid account with a supported dynamic DNS service provider are required.

10.6 WAN Health Check

To improve reliability, PepLink Balance provides the functionality to periodically check the health of each WAN connection.

The Health Check settings for each WAN connection can be independently configured via ***Advanced Setup > Interfaces > WAN Setup***:



Health Check Settings	
Method	This setting specifies the Health Check method for the WAN link. The value of Method can either be configured as ***Disabled***, ***Ping*** or ***DNS Lookup***. If the value of Method is set to ***Disabled***, the WAN link is always considered "up". The link will not be treated as down in the event of IP routing errors. If the value of Method is set to ***Ping***, then ICMP Ping packets will be issued to test the connectivity with a configurable target IP address or hostname. A WAN link is considered "up" if ping responses are received from the target IP address. If the value of Method is set to ***DNS Lookup***, then DNS lookups will be issued to test the connectivity with a configurable target DNS server IP address. The connection will be treated as up if DNS responses are received (regardless of whether the result was positive or negative). By default, the Method is configured as ***Disabled***.
Ping Host	This setting is applicable only when the value for ***Method*** is set to ***Ping***, and specifies an IP address or a host name with which connectivity is to be tested via ICMP Ping. If ***Use first DNS server as Ping Host*** is checked, the target ping host will be the first DNS server for the corresponding WAN connection. A reliable ping host with a high up-time is recommended.
Health Check DNS Server	This setting is applicable only when the value for ***Method*** is set to ***DNS Lookup***, and specifies an IP address with which connectivity is to be tested via DNS Lookup. If ***Use first DNS server as Health Check DNS Server*** is checked, the target DNS host will be the first DNS server for the corresponding WAN connection. A reliable target with a high up-time is recommended.
Time Interval	This setting specifies the time interval, in seconds, between ping requests. By default, the Time Interval is 5 seconds.

Health Check Settings	
Retry Times	This setting specifies the number of ping timeouts after which PePLink is to treat the corresponding WAN link as "down". By default, Retry Times is set to 1. For example, with the default Retry Times setting of 1, after 1 ping timeout, the corresponding WAN link is treated as "down".
Recovery Times	This setting specifies the number of successful Ping responses that must be received in order to consider a previously "down" WAN link to be "up" once again. By default, Recover Times is set to 1. For example, with the default Recover Times setting of 1, a WAN link that was treated as "down" is considered to be "up" once again upon receiving 1 successful ping response.
Timeout	This setting specifies the timeout, in seconds, for ping requests. By default, Timeout is set to 1 second.

11 Firewall Configuration

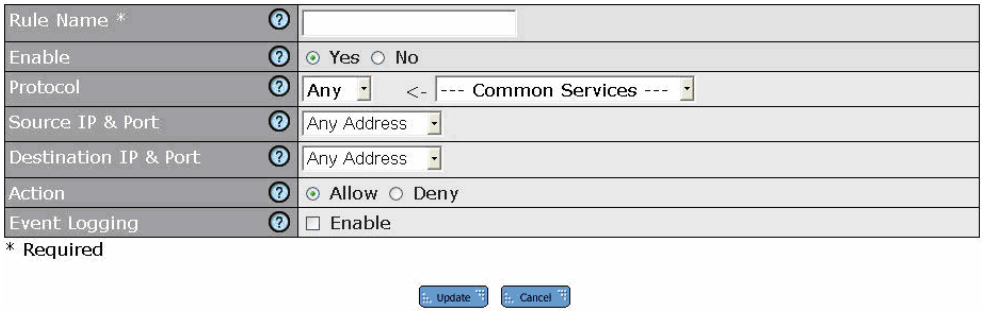
In computer networking, a firewall is a mechanism that selectively filters data traffic between the WAN side (the Internet) and the LAN side (local private network or computer systems) of the network. A firewall can protect the local network from potential hacker attacks, offensive Web sites, and/or other inappropriate uses.

The firewall functionality of PePLink Balance supports the selective filtering of data traffic in both directions:

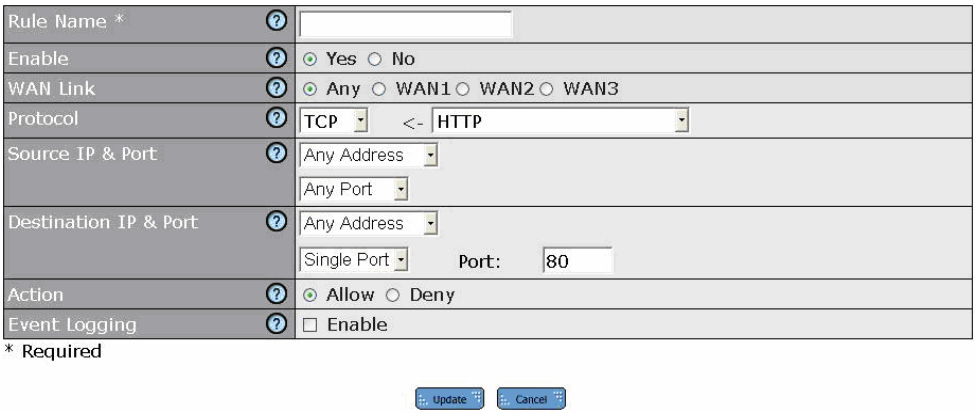
- LAN to WAN (Outbound)
- WAN to LAN (Inbound)

The outbound firewall settings are located in ***Advanced Setup > Firewall > Outbound***:

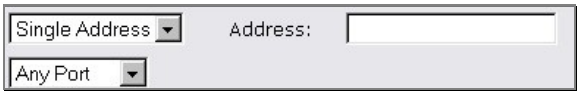
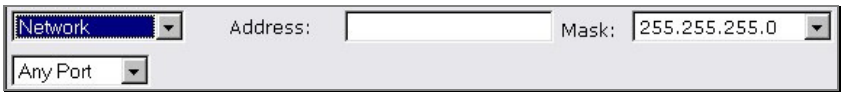
Upon clicking ***Add New***, the following screen appears:

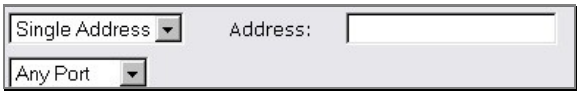


The inbound firewall settings are located in ***Advanced Setup > Firewall > Inbound***:



Inbound / Outbound Firewall Settings	
Rule Name	This setting specifies a name for the firewall rule.
Enable	This setting specifies whether the firewall rule should take effect. With an Enable value of ***Yes***, the firewall rule takes effect: traffic is matched, and actions are taken, by PepLink Balance based on the other parameters of the rule. With an Enable value of ***No***, the firewall rule does not take effect: PepLink Balance disregards the other parameters of the rule.
WAN Link	This setting specifies the WAN Link(s) on which the rule applies: • Any • WAN1 • WAN2 • WAN3 (applicable only to PepLink Balance 30, 300 and 700) • WAN4 to WAN7 (applicable only to PepLink Balance 700) A value of ***Any***, ***WAN1***, ***WAN2***, … and ***WAN7*** specifies that the rule applies to all WAN links, WAN1, WAN2, … and WAN7, respectively.
Protocol	This setting specifies the protocol to be matched. Via a drop-down menu, the following protocols can be specified: • TCP • UDP • ICMP • IP Alternatively, the ***Common Services*** drop-down menu can be used to automatically fill in the Protocol and Port number of common Internet services (e.g. HTTP, HTTPS, etc.) After selecting an item from the ***Common Services*** drop-down menu, the Protocol and Port number remains manually modifiable.

Inbound / Outbound Firewall Settings	
Event Logging	This setting specifies whether or not to log matched firewall events. The logged messages are shown on the page ***Utilities > Logs***: A sample message is as follows: `Aug 13 23:47:44 Denied CONN=WAN1 SRC=20.3.2.1 DST=192.168.1.20 LEN=48 PROTO=TCP SPT=2260 DPT=80` • ***CONN***: The connection to which the log entry refers. Possible values are `LAN` and `WANx`, where `x` is the WAN number. • ***SRC***: Source IP address • ***DST***: Destination IP address • ***LEN***: Packet length • ***PROTO***: Protocol • ***SPT***: Source port • ***DPT***: Destination port
Source IP & Port	This specifies the source IP address(es) and port number(s) to be matched for a firewall rule. A single address, or a network, can be specified as the Source IP & Port setting, as indicated with the following screenshots:   In addition, a single port, or a range of ports, can be specified for the Source IP & Port setting, as the following indicates:

Inbound / Outbound Firewall Settings	
Destination IP & Port	This specifies the destination IP address(es) and port number(s) to be matched for a firewall rule. A single address, or a network, can be specified as the Source IP & Port setting, as indicated with the following screenshots:  In addition, a single port, or a range of ports, can be specified for the Source IP & Port setting, as the following indicates:
Action	This setting specifies the action to be taken by PePLink Balance upon encountering traffic that matches the both of the following: • Source IP & Port • Destination IP & Port With the value of ***Allow*** for the Action setting, the matching traffic passes through PePLink Balance (to be routed to the destination). If the value of the Action setting is set to ***Deny***, the matching traffic does not pass through PePLink Balance (and is discarded).

Upon clicking ***Update*** after entering required information, the following screen appears.

To create an additional firewall rule, click ***Add New***.

12 Management of Outbound Traffic to WAN

PePLink Balance provides the functionality to manage and load balance outbound traffic among the WAN links.

The settings for managing and load balancing outbound traffic are located in ***Advanced Setup > Outbound Traffic Management***:

12.1 Outbound Traffic Policy

There are three main selections for the Outbound Traffic Policy of PePLink Balance:

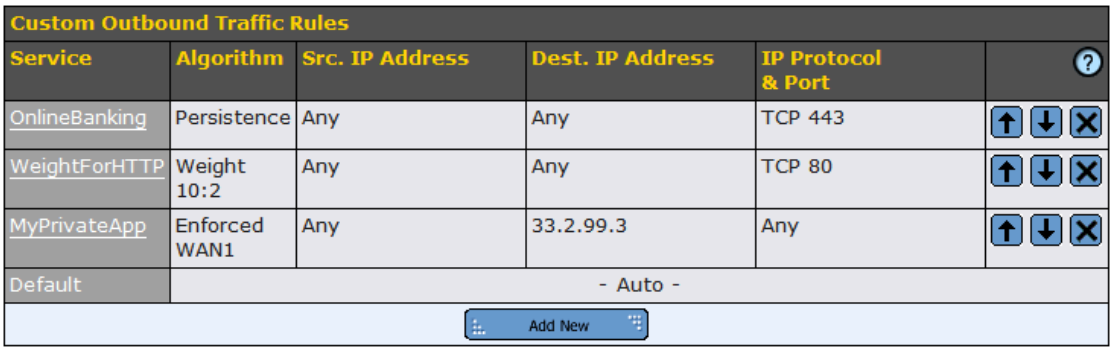
- High Application Compatibility
- Normal Application Compatibility
- Custom Outbound Traffic Rules

The selections are explained as follows:

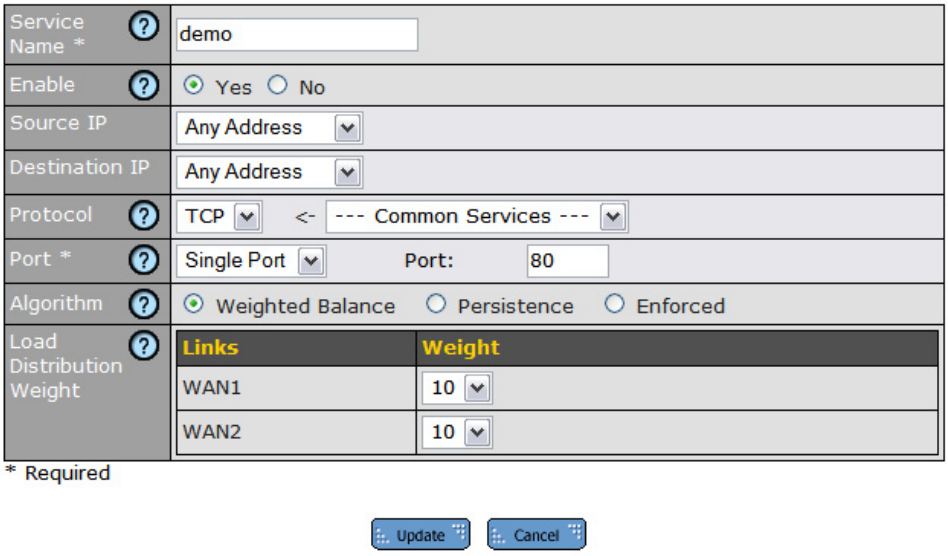
Outbound Traffic Policy Settings	
High Application Compatibility	With the selection of this policy, outbound traffic from a source LAN device is routed through the same WAN connection regardless of the destination Internet IP address and protocol. This provides the highest application compatibility.
Normal Application Compatibility	With the selection of this policy, outbound traffic from a source LAN device to the same destination Internet IP address will persistently be routed through the same WAN connection regardless of protocol. This provides high compatibility to most applications, and users still benefit from WAN link load balancing when multiple Internet servers are accessed.
Custom Outbound Traffic Rules	With the selection of this policy, outbound traffic behavior can be managed by defining custom rules. The rules can control matched traffic to be routed persistently through one WAN connection, or load balanced among multiple WAN connections with a specified ratio. Unmatched traffic is distributed among all of the active WAN connections, based on the respective downstream bandwidth values.

12.2 Fine Tuning Load Distribution for Individual Services

By selecting the Outbound Traffic Policy of ***Custom Outbound Traffic Rules*** from the drop-down menu, the following table is then displayed.



To create a custom outbound traffic rule, click ***Add New*** at the bottom of the table, upon which the following screen is displayed:



Load Distribution Settings	
Service Name	This setting specifies the name of the outbound traffic rule.
Enable	This setting specifies whether the outbound traffic rule takes effect. With an Enable value of ***Yes***, the rule takes effect: traffic is matched, and actions are taken, by PePLink Balance based on the other parameters of the rule. With an Enable value of ***No***, the rule does not take effect: PePLink Balance disregards the other parameters of the rule.
Source IP	This setting specifies the Source IP address for the traffic to be matched for the rule.

Load Distribution Settings	
Destination IP	This setting specifies the Destination IP address for the traffic to be matched for this rule.
IP Protocol & Port	This setting specifies the IP Protocol and Port of the traffic to be matched for this rule.
Balance Mode	This setting specifies the behavior of PePLink Balance for the outbound traffic rule. One of the following valid values can be specified: • Weighted Balance • Persistence • Enforced The immediately following rows, **Load Distribution Weight**, **Enforced Connection** and Section 12.3, **Configuration of Persistent Services** present details of PePLink Balance's behavior with the mentioned values.
Load Distribution Weight	This setting specifies the ratio of WAN link usage to be applied on the specified IP Protocol & Port, and is applicable only when Balance Mode is set to ***Weighted Balance***. The amount of matching traffic that is distributed to a WAN link is proportional to the weight of WAN link relative to the total weight. Example: With the following weight settings on a PePLink Balance 300: • WAN1: 10 • WAN2: 10 • WAN3: 5 Total weight is 25 = (10 + 10 + 5) Matching traffic distributed to WAN1 is 40% = (10 / 25) x 100% Matching traffic distributed to WAN2 is 40% = (10 / 25) x 100% Matching traffic distributed to WAN3 is 20% = (5 / 25) x 100%
Enforced Connection	This setting specifies the WAN link usage to be applied on the specified IP Protocol & Port, and is applicable only when Balance Mode is set to ***Enforced***. Matching traffic will be routed through the specified WAN connection regardless of health check status of the WAN link.

Tip
Configure multiple distribution rules to accommodate different kinds of services.

12.3 Configuration of Persistent Services

The configuration of Persistent Services is the solution to the few situations where link load distribution for Internet services is undesirable.

For example, many e-banking and other secure websites, for security reasons, terminate the session when the client computer's Internet IP address changes mid-session.

In general, different Internet IP addresses represent different computers. The security concern is that an IP address change during a session may be the result of an unauthorized intrusion attempt. Therefore, to prevent damages from the potential intrusion, the session is terminated upon the detection of an IP address change.

PePLink Balance can be configured to distribute data traffic across multiple WAN links. Also, the Internet IP depends on the WAN links over which communication actually takes place. As a result, a LAN client computer behind PePLink Balance may communicate using multiple Internet IP addresses. For example, a LAN client computer behind a PePLink Balance 300 with three WAN links may communicate on the Internet using three different IP addresses.

With the Persistency feature of PePLink balance, rules can be configured to enable client computers to persistently utilize the same WAN links for e-banking and other secure websites. As a result, a client computer will communicate using one IP address and eliminate the issues.

The Persistent setting overrides the load distribution settings mentioned in Section 13.2, **Fine Tuning Load Distribution for Individual Services**.

13 Management of Inbound Access from WAN

When operating under NAT mode, PePLink Balance acts as a firewall that blocks, by default, all inbound access from the Internet.

By the custom definition of servers and services for inbound access, Internet users can access the servers behind PePLink Balance. Advanced configurations allow inbound access to be distributed among multiple servers on the LAN.

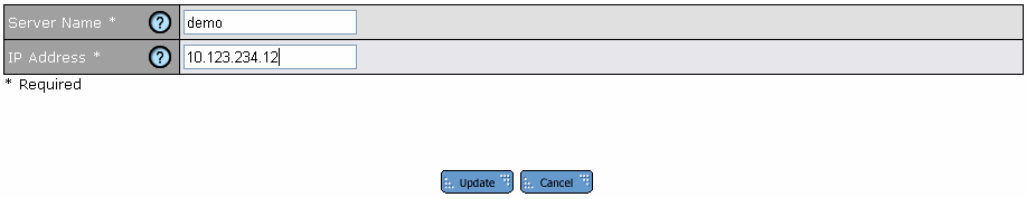
Important Note
Inbound access management applies only to WAN links of PePLink Balance that operate under NAT mode. For WAN links of PePLink that operate under IP Forwarding, inbound traffic is forwarded to the LAN by default.

13.1 Definition of Servers on LAN

(This section applies only to PePLink Balance 200, 300 and 700.)

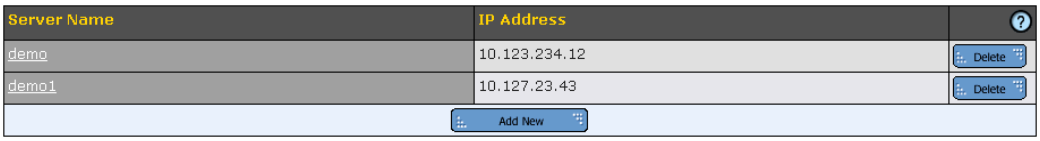
The settings to configure servers on the LAN are located at the following location: ***Advanced Setup > Inbound Access > Servers***:

To define a new server, click ***Add New***, upon which the following screen appears:



Enter a valid server name (consisting only of alphanumeric and the underscore "_" characters), and the corresponding LAN IP address.

Upon clicking ***Update*** after entering required information, the following screen appears.

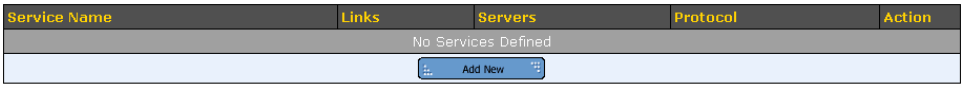


To define additional servers, click ***Add New***.

13.2 Definition of Services

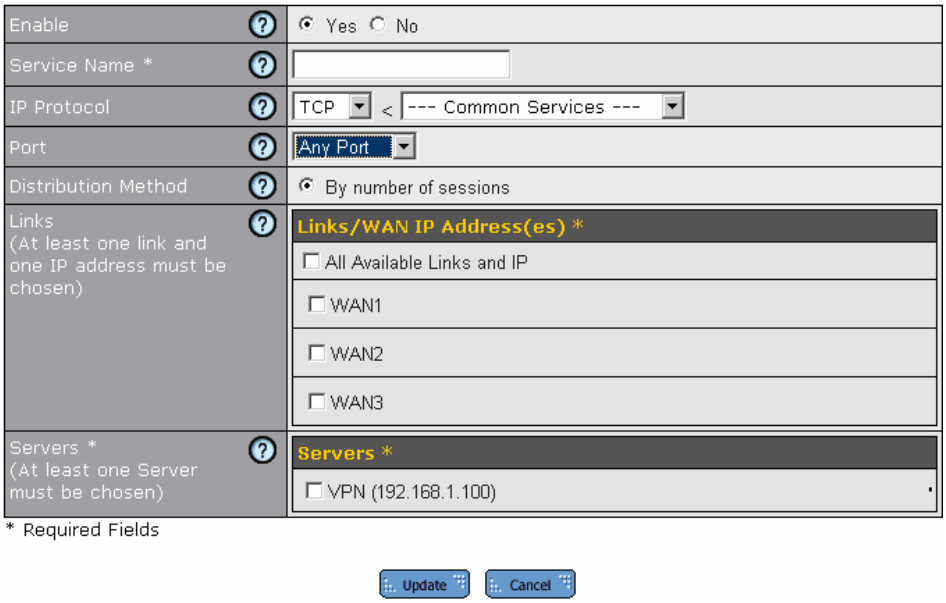
(This section applies only to PePLink Balance 200, 300 and 700.)

Services are defined at ***Advanced Setup > Inbound Access > Services***:



Tip
At least one server must be defined before services can be added. Please refer to Section 13.1, **Definition of Servers on LAN**, as necessary.

To define a new service, click the ***Add New*** button, upon which the following appears:



Services Settings	
Enable	This setting specifies whether the Inbound Service takes effect. With an Enable value of ***Yes***, the inbound service takes effect: traffic is matched, and actions are taken, by PePLink Balance based on the other parameters of the rule. With an Enable value of ***No***, the inbound service does not take effect: PePLink Balance disregards the other parameters of the rule.
Service Name	This setting identifies the service to the System Administrator. Valid values for this setting consist only of alphanumeric and the underscore "_" characters.

Services Settings	
IP Protocol	The IP Protocol setting, along with the Port setting, specify the protocol of the service as one of the following valid values: • TCP • UDP • ICMP • IP Traffic that is received by PePLink Balance via the specified protocol at the specified port(s) is forwarded to the LAN hosts specified by the Servers setting. (Please refer below for details on the Port and Servers settings.) Alternatively, the ***Common Services*** drop-down menu can be used to automatically fill in the Protocol and a single Port number of common Internet services (e.g. HTTP, HTTPS, etc.) After selecting an item from the ***Common Services*** drop-down menu, the Protocol and Port number remains manually modifiable.

Services Settings	
Port	The Port setting specifies the port(s) that correspond to the service, and can be configured to behave in one of the following manners: • Any Port • Single Port • Port Range • Port Map Any Port – When configured to ***Any Port***, all traffic that is received by PePLink Balance via the specified protocol is forwarded to the servers specified by the Servers setting. For example, with IP Protocol set to ***TCP***, and Port set to ***Any Port***, all TCP traffic is forwarded to the configured servers. Single Port – When configured to ***Single Port***, traffic that is received by PePLink Balance via the specified protocol at the specified port is forwarded via the same port to the servers specified by the Servers setting. For example, with IP Protocol set to ***TCP***, and Port set to ***Single Port*** and ***Service Port*** 80, TCP traffic received on Port 80 is forwarded to the configured servers via Port 80. Port Range – When configured to ***Port Range***, traffic that is received by PePLink Balance via the specified protocol at the specified port range is forwarded via the same respective ports to the LAN hosts specified by the Servers setting. For example, with IP Protocol set to ***TCP***, and Port set to ***Single Port*** and ***Service Port*** 80-88, TCP traffic received on ports 80 through 88 is forwarded to the configured servers via the respective ports. Port Map – When configured to ***Port Map***, traffic that is received by PePLink Balance via the specified protocol at the specified port is forwarded via a different port to the servers specified by the Servers setting. For example, with IP Protocol set to ***TCP***, and Port set to ***Port Map***, ***Service Port*** 80, and ***Map to Port*** 88, TCP traffic on Port 80 is forwarded to the configured servers via Port 88. (Please refer below for details on the Servers setting.)
Distribution Method	This setting specifies the how the traffic is shared among the LAN hosts specified in the Servers setting. Currently, the setting has only one valid value: • By Number of Sessions When Distribution Method is set to ***By Number of Sessions***, PePLink Balance distributes traffic based on the configured weight values and number of sessions already assigned to each server. (Refer below for details on the Servers and Weight Value settings.)

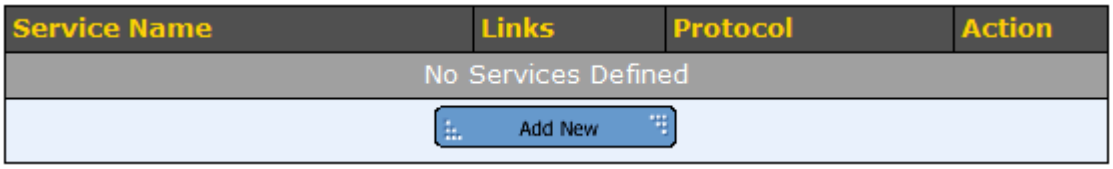
Services Settings	
Links	This setting specifies the WAN links and Internet IP address(es) from which the service can be accessed.
Servers	This setting specifies the LAN servers that handle requests for the service, and the relative weight values. The amount of traffic that is distributed to a server is proportional to the weight value assigned to the server relative to the total weight. Example: With the following weight settings on a PePLink Balance: • demo_server_1: 10 • demo_server_2: 5 The total weight is 15 = (10 + 5) Matching traffic distributed to demo_server_1: 67% = (10 / 15) x 100% Matching traffic distributed to demo_server_2: 33% = (5 / 15) x 100%

13.3 Definition of Porting Forwarding

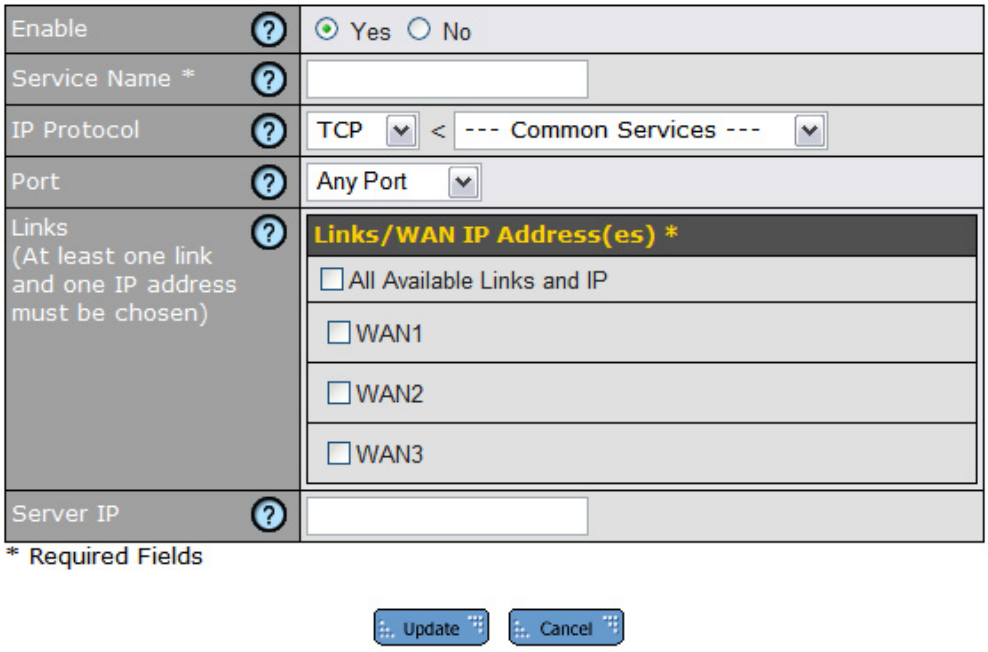
(This section applies only to PePLink Balance 30.)

Inbound Port Forwarding rules are defined at:

Advanced Setup > Inbound Access > Port Forwarding:



To define a new service, click the ***Add New*** button, upon which the following appears:



Port Forwarding Settings	
Enable	This setting specifies whether the Inbound Service takes effect. With an Enable value of ***Yes***, the inbound service takes effect: traffic is matched, and actions are taken, by PePLink Balance based on the other parameters of the rule. With an Enable value of ***No***, the inbound service does not take effect: PePLink Balance disregards the other parameters of the rule.
Service Name	This setting identifies the service to the System Administrator. Valid values for this setting consist only of alphanumeric and the underscore "_" characters.

Port Forwarding Settings	
IP Protocol	The IP Protocol setting, along with the Port setting, specify the protocol of the service as one of the following valid values: • TCP • UDP • ICMP • IP Traffic that is received by PePLink Balance via the specified protocol at the specified port(s) is forwarded to the LAN hosts specified by the Servers setting. (Please refer below for details on the Port and Servers settings.) Alternatively, the ***Common Services*** drop-down menu can be used to automatically fill in the Protocol and a single Port number of common Internet services (e.g. HTTP, HTTPS, etc.) After selecting an item from the ***Common Services*** drop-down menu, the Protocol and Port number remains manually modifiable.

Port Forwarding Settings	
Port	The Port setting specifies the port(s) that correspond to the service, and can be configured to behave in one of the following manners: • Any Port • Single Port • Port Range • Port Map Any Port – When configured to ***Any Port***, all traffic that is received by PePLink Balance via the specified protocol is forwarded to the servers specified by the Servers setting. For example, with IP Protocol set to ***TCP***, and Port set to ***Any Port***, all TCP traffic is forwarded to the configured servers. Single Port – When configured to ***Single Port***, traffic that is received by PePLink Balance via the specified protocol at the specified port is forwarded via the same port to the servers specified by the Servers setting. For example, with IP Protocol set to ***TCP***, and Port set to ***Single Port*** and ***Service Port*** 80, TCP traffic received on Port 80 is forwarded to the configured servers via Port 80. Port Range – When configured to ***Port Range***, traffic that is received by PePLink Balance via the specified protocol at the specified port range is forwarded via the same respective ports to the LAN hosts specified by the Servers setting. For example, with IP Protocol set to ***TCP***, and Port set to ***Single Port*** and ***Service Port*** 80-88, TCP traffic received on ports 80 through 88 is forwarded to the configured servers via the respective ports. Port Map – When configured to ***Port Map***, traffic that is received by PePLink Balance via the specified protocol at the specified port is forwarded via a different port to the servers specified by the Servers setting. For example, with IP Protocol set to ***TCP***, and Port set to ***Port Map***, ***Service Port*** 80, and ***Map to Port*** 88, TCP traffic on Port 80 is forwarded to the configured servers via Port 88. (Please refer below for details on the Servers setting.)
Links	This setting specifies the WAN links and Internet IP address(es) from which the service can be accessed.
Server IP	This setting specifies the LAN IP address of the server that handles the requests for the service.

13.4 Definition of DNS Records

(This section applies only to PePLink Balance 200, 300 and 700.)

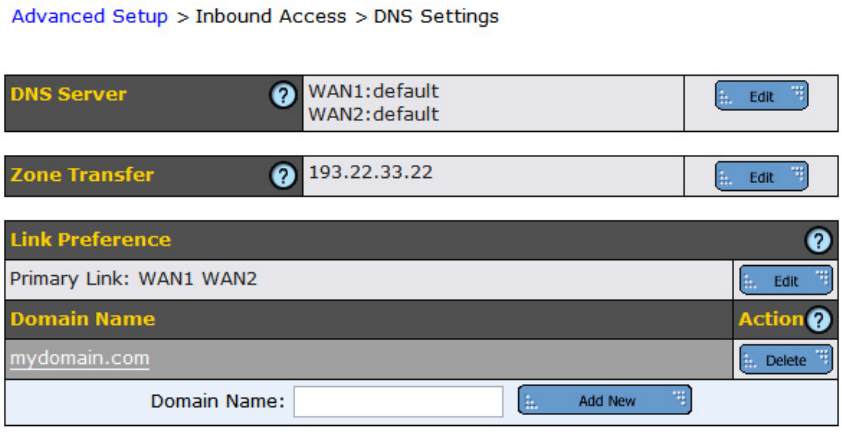
The built-in DNS Server functionality of PePLink Balance facilitates inbound load balancing. With the presence of the functionality, NS/SOA DNS records for a domain name can be delegated to Internet IP address(es) of PePLink Balance. Upon receiving a DNS query, PePLink Balance supports returning, as an "A" record, the corresponding IP address for the domain name on the most appropriate healthy WAN link. It also supports acting as a generic DNS server for hosting "A", "CNAME", "MX", "TXT" and "NS" records.

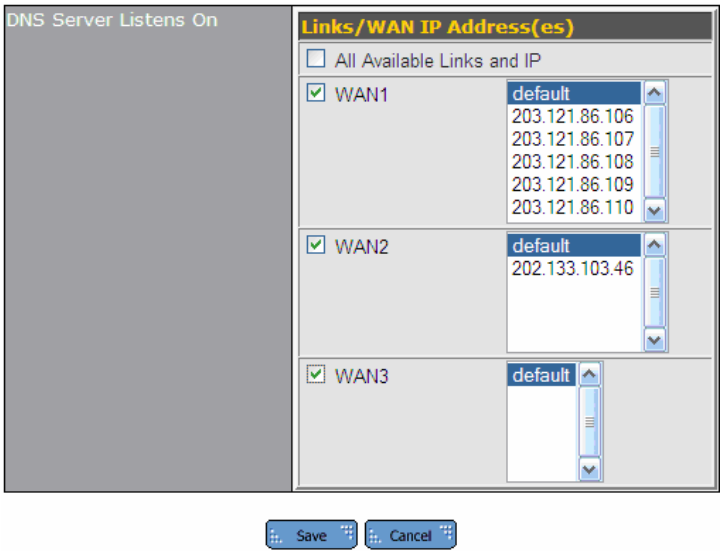
For example:

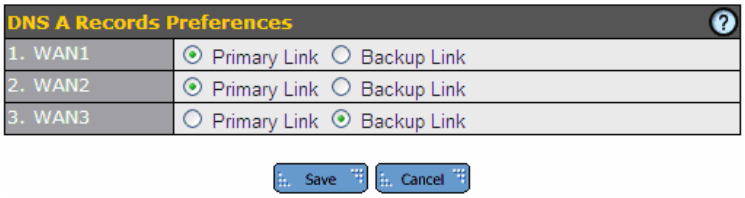
(This example is for illustration only; the actual resolution that takes place in implementation will likely be different.)

- The DNS resolution of the domain name www.mycompany.com is delegated to the WAN2 Internet IP addresses of PePLink Balance.
- Upon receiving the DNS query, PePLink Balance returns, as an "A" record, the IP address for www.mycompany.com on WAN1 because WAN1 is the most appropriate healthy link.

The settings for defining the DNS records to be hosted by PePLink Balance are located at ***Advanced Setup > Inbound Access > DNS Settings***:



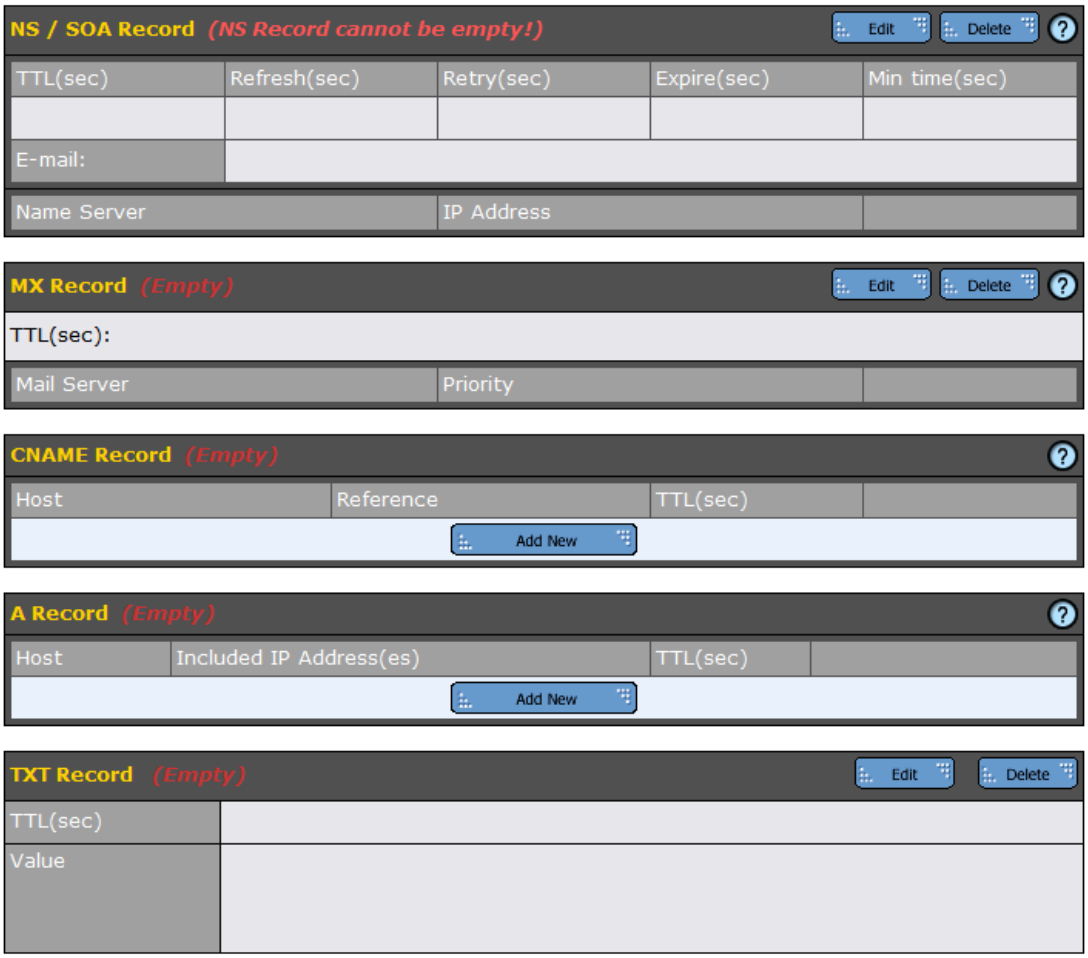
DNS Settings	
DNS Server	This setting specifies the WAN IP addresses on which the DNS server of PePLink Balance should listen. If no addresses are selected, the Inbound Link Load Balancing feature will be disabled; PePLink Balance will not respond to DNS requests. To specify and/or modify the IP addresses on which the DNS Server should listen, click the ***Edit*** button that corresponds to ***DNS Server Listens on***, and the following screen is displayed:  To specify the Internet IP addresses on which the DNS Server should listen, select the WAN link by checking the appropriate boxes and the IP addresses associated with the WAN links by highlighting the appropriate items in the list. (Multiple items in the list can be selected by holding CTRL and clicking on the items.) Click ***Save*** to save the settings when configuration is complete.
Zone Transfer	This setting specifies the IP address(es) of secondary DNS server(s) that are to be allowed to retrieve zone records from the DNS server of PePLink Balance. The zone transfer server of PePLink Balance listens on TCP Port 53. PePLink Balance serves both the clients that are accessing from the specified IP addresses, and the clients that are accessing from the LAN Interface (of the PePLink Balance unit).

DNS Settings	
Link Preference	The setting defines the relative preferences among the WAN links when PePLink Balance receives a DNS query. When responding to a DNS query, PePLink Balance returns an Internet IP address that corresponds to the Primary Link(s) if the Primary Links are up. In the event that all Primary Links are down, an Internet IP address corresponding to a Backup Link is returned. To specify the Primary and Backup links, click the ***Edit*** button that corresponds to ***Link Preference***, upon which the following screen is displayed:  Each WAN link can be configured as either a ***Primary Link*** or ***Backup Link*** through the radio buttons. Click ***Save*** to save the settings when configuration is complete.
Domain name	This section shows a list of domain names to be hosted by the PePLink Balance. Each domain can have its "NS", "MX" and "TXT" records, and its or its sub-domains' "A" and "CNAME" records. Input the domain name into the "Domain Name" field and click the Add New button to add a new one. Click on a domain name to edit. Click the Delete button on the right of a domain name to delete.

13.4.1 Creating DNS Records

To create new DNS records for a domain, perform the following steps:

From **Advanced Setup -> Inbound Access -> DNS Settings**, enter a domain name in the Domain Name field, click the ***Add New*** button. Then click on the newly created domain name and the following screen is displayed:

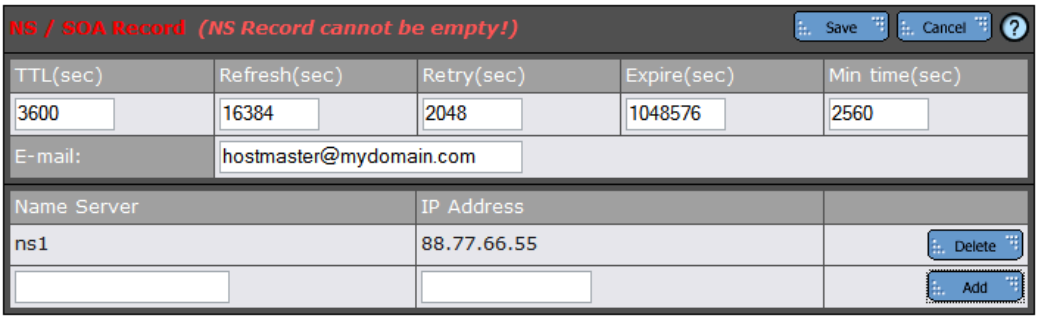


This page is for defining the domain's NS, MX, CNAME, A and TXT records. Five tables are presented in this page for defining the five types of records.

13.4.2 NS / SOA Record

The NS / SOA Record table shows the NS servers, A records, TTL, Refresh Time, Retry Time, Expire Time, Minimum Time, and E-mail contact address, that correspond to the domain.

To add or edit an NS record, click the upper ***Edit*** button in the **NS Record** box. Then the table will expand to look like the following:



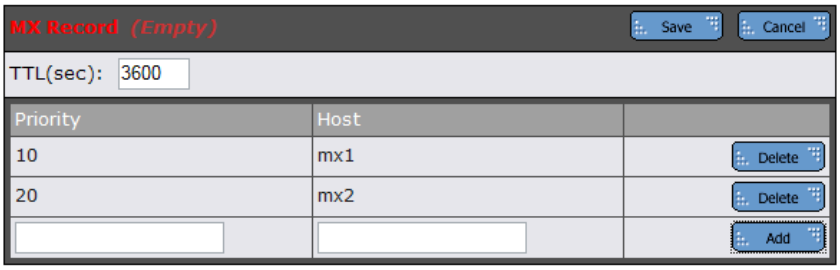
The first two rows are the settings of TTL, Refresh Time, Retry Time, Expiry Time, Minimum Time and E-mail:

- **TTL (Time-to-Live)**: Defines the duration in seconds that the record may be cached
- **Refresh**: Indicates the time when the slave will try to refresh the zone from the master.
- **Retry**: Defines the time between retries if the slave (secondary) fails to contact the master when *refresh* (above) has expired.
- **Expire**: Indicates when the zone data is no longer authoritative.
- **Min Time**: Negative caching time – the time an error record is cached
- **E-mail**: Defines the E-mail address of the person responsible for this zone. Note: the "@" sign in the E-mail address field will be converted into a dot (".") in returning the SOA record.

You can enter a name server host name and its IP address into the two newly created text boxes. The host name can be a non-FQDN (fully qualified domain name). Click the ***Add*** button on the right to finish and to add the other one. After finished adding NS records, click the ***Save*** button. (Before clicking the ***Save*** button, all NS record changes are not yet saved to the PePLink Balance.)

13.4.3 MX Record

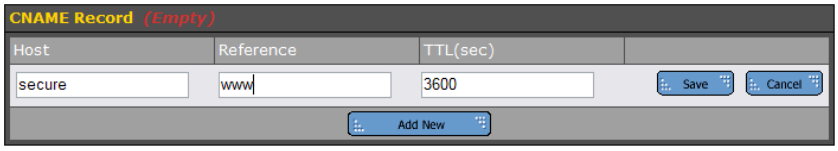
The MX Record table shows the domain's MX records. Each MX record contains the priority and mail exchange server host name.



For each record, **Priority** and **Host** name must be entered. **Priority** typically ranges from 10 to 100. Smaller numbers have a higher a priority. After finishing adding MX records, click the ***Save*** button.

13.4.4 CNAME Record

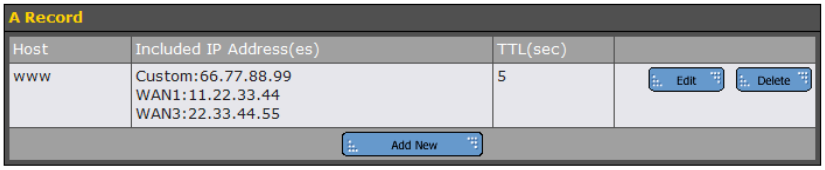
The CNAME Record table shows the domain's CNAME records. Here is how you use CNAME Records - If you want a sub-domain "secure" to have the same A record value(s) as "www", then you can create a CNAME record for "secure" and reference it to "www".



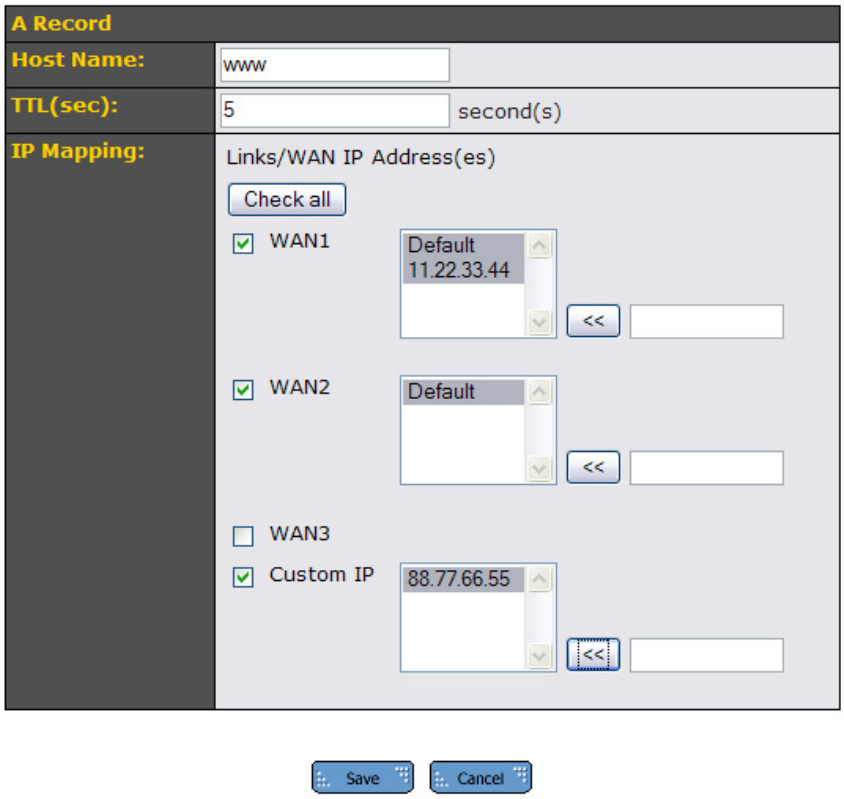
The **TTL** field tells the time to live of the record in external DNS caches.

13.4.5 A Record

This table shows the A records of the domain name.



To add an A record, click the ***Add New*** button. The following form will be shown:

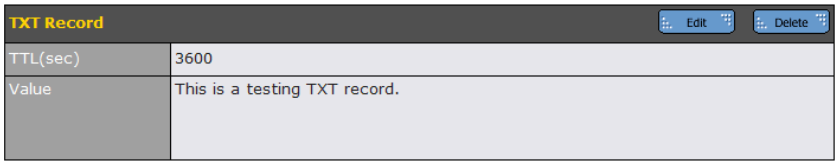


A Record Editing	
Host Name	This field specifies the A record of this sub-domain to be served by the PePLink Balance.
TTL	This setting specifies the time to live of this record in external DNS caches. In order to reflect any dynamic changes on the IP addresses in case of link failure and recovery, this value should be set to a smaller value. E.g. 5 secs, 60 secs, etc.

A Record Editing	
IP Mapping	This setting specifies lists of WAN-specific Internet IP addresses that are candidates to be returned when PePLink Balance responds to DNS queries for the domain name specified by Host Name. The IP addresses listed in each box as **Default** are the Internet IP addresses associated with each of the WAN links. For WAN links that operate under IP Forwarding mode, there may be other routable IP addresses in addition to the **Default** IP address. Therefore, PePLink Balance allows custom Internet IP addresses to be added manually via filling the text box on the right-hand side and clicking the **<<** button. Only the highlighted IP addresses in the lists are candidates to be returned when responding to a DNS query. (Multiple items in a list can be selected by holding CTRL and clicking on the items.) In case of a WAN link is down, the corresponding set of IP addresses will not be returned. However, the IP addresses in the Custom IP field will always be returned.

13.4.6 TXT Record

This table shows the TXT record the domain name.



Click the ***Edit*** button to edit the record. The time-to-live value and the TXT record's value can be entered. Click the Save button to finish.

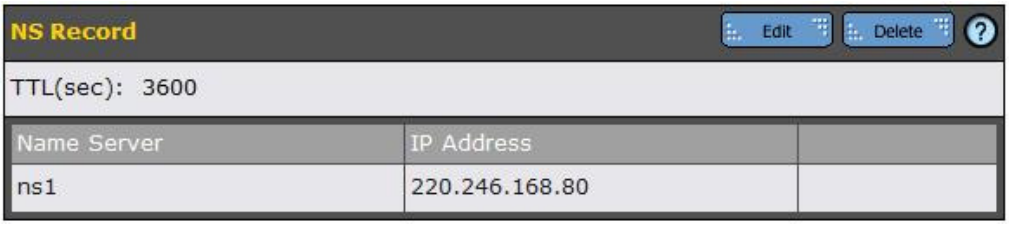
After completing editing the fives types of record, you can click the link ***DNS Setting*** to leave the page.

DNS Registration and Hosting

Domain Delegation

These are the steps to be used when you host your domain at your ISP or a domain registrar and want to delegate a sub-domain to be resolved and managed at PePLink Balance.

1. Create a domain, eg. "www.mycompany.com"
2. Create NS records named "ns1", "ns2", etc. The IP addresses are the Balance's DNS server addresses.



3. Then create an A record with empty host name:

If ISC BIND 8 or 9 is being utilized in the zone file mycompany.com, then the addition of the following lines suffice:

```
www             IN    NS    balancewan1
www             IN    NS    balancewan2
balancewan1     IN    A     202.153.122.108
balancewan2     IN    A     67.38.212.18
```

202.153.122.108 and 67.38.212.18 represent the WAN1 and WAN2 Internet IP addresses of PePLink Balance, respectively. The values of the IP addresses are fictitious and for illustration only; the actual IP addresses in implementation will likely be different.

Hosting the complete domain at PePLink Balance

To host your own DNS server, contact the DNS registrar to have the NS records of the domain (eg. "mycompany.com") point to your Balance's WAN IP addresses. Then follow these instructions:

1. Under **Advanced Setup > Inbound Access > DNS Settings**, create a new domain, for example "mycompany.com".
2. Create NS records named "ns1", "ns2", etc. The IP addresses are the Balance's DNS server addresses (same as above).
3. Create the corresponding A, CNAME, MX and TXT records as you wish. The A record would look like this:

Testing the DNS Configuration

The following steps can be use to test the DNS configuration:

From a host on the Internet, use an IP address of PePLink Balance and nslookup to lookup the corresponding hostname.

Check the information that is returned for the expected results.

An example with nslookup in Windows follows:

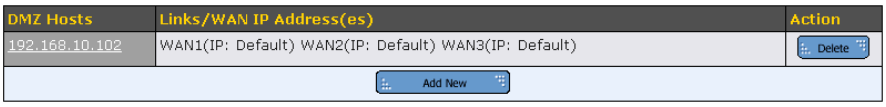
```
C:\Documents and Settings\User Name>nslookup
Default Server:  ns1.myisp.com
Address:  147.22.11.2

> server 202.153.122.108 (This is PePLink Balance's WAN IP address.)
Default Server:  balance.mycompany.com
Address:  202.153.122.108

> www.mycompany.com       (This is the hostname to look up.)
Default Server:  balance.mycompany.com
Address:  202.153.122.108

Name:    www.mycompany.com
Address:  202.153.122.109, 67.38.212.19
```

The values of the IP addresses are fictitious and for illustration only; the actual IP addresses in implementation will likely be different.

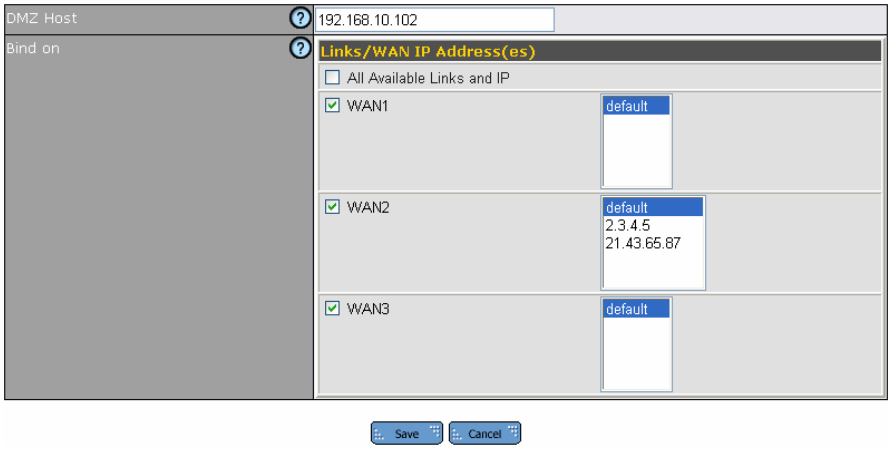
14 Configuration of DMZ Servers

The configuration of DMZ Servers allows the mapping of all inbound WAN traffic to an internal server.

The settings to configure DMZ Servers are located at ***Advanced Setup > DMZ Servers***:



To add a DMZ Server, click ***Add New***, upon which the following screen is displayed:



DMZ Server Settings	
DMZ Host	This setting specifies the LAN IP address of the DMZ Server.
Bind on	These settings specify the WAN links and corresponding WAN-specific Internet IP addresses on which the DMZ Server should bind. To specify the Internet IP addresses on which the DNS Server should listen, select the WAN link by checking the appropriate boxes, and the IP addresses associated with the WAN links by highlighting the appropriate items in the list.

Click ***Save*** to save the settings when configuration is complete.

Important Note
DMZ Server configurations should be defined for WAN links that operate under NAT mode. Inbound firewall rules override DMZ Server settings.

15 Miscellaneous Settings

The miscellaneous settings include configuration for high availability, quality of service, time server, SNMP, email notification, and remote system log.

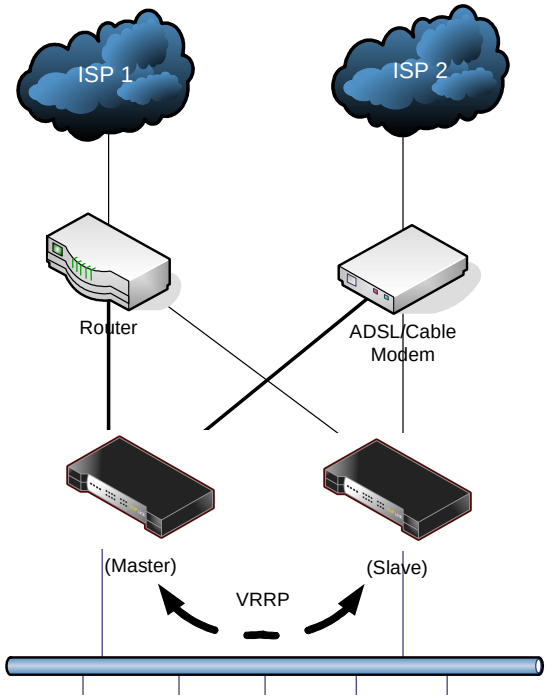
15.1 High Availability

(This section applies only to PePLink Balance 200, 300 and 700.)

PePLink Balance supports High Availability (HA) configurations via an open standard Virtual Router Redundancy Protocol (VRRP, RFC 3768).

In an HA configuration, two same-model PePLink Balance units (i.e. a pair of PePLink Balance 200 units, or a pair of PePLink Balance 300 units) provide redundancy and failover in a master-slave arrangement. From a high level, in the event that the Master Unit is down, the Slave Unit becomes active.

The following diagram illustrates an HA configuration with two PePLink Balance 200 units, and two Internet links:



In the diagram, the WAN ports on each PePLink Balance unit connect to the router and modem; and PePLink Balance unit connects to the same LAN switch via a LAN port.

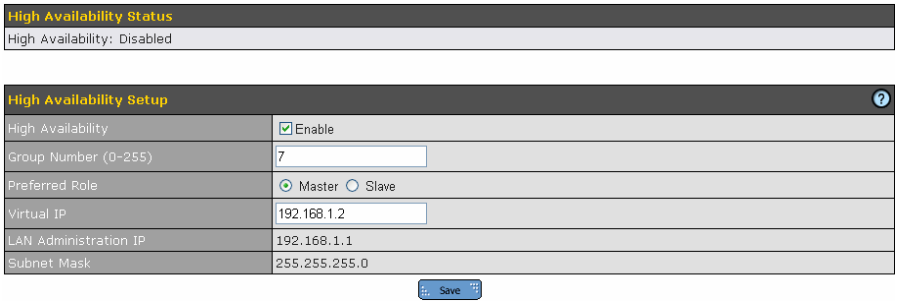
An elaboration on the technical details of the implementation, by PePLink Balance, of Virtual Router Redundancy Protocol (VRRP, RFC 3768) follows:

- In an HA configuration, the two PePLink Balance units communicate with each other using VRRP over the LAN.
- The two PePLink Balance units broadcast heartbeat signals to the LAN at a frequency of one heartbeat signal per second.
- In the event that no heartbeat signal from the Master PePLink Balance unit is

received in 3 seconds (or longer) since the last heartbeat signal, the Slave PePLink Balance unit becomes active.

- The Slave PePLink Balance unit initiates the WAN links, and binds to a previously configured LAN IP address.
- At a subsequent point when the Master PePLink Balance unit recovers, it will once again become active.

The settings to configure High Availability are located at the following location: ***Advanced Setup > Misc. Settings > High Availability***:



High Availability Settings	
High Availability	Checking this box specifies that the PePLink Balance unit is part of a High Availability configuration.
Group Number	This setting specifies a number that identifies a pair of PePLink Balance units that operate in a High Availability configuration. The two PePLink Balance units in the pair must have the same Group Number value.
Preferred Role	This setting specifies whether the PePLink Balance unit operates in Master or Slave mode. Click the corresponding radio button to set the role of the unit. One of the units in the pair must be configured as the Master and the other unit must be configured as the Slave
Virtual IP	The setting specifies the LAN IP address on which the active PePLink Balance listens. The value of Virtual IP represents a LAN IP address that is shared among the Master and Slave units; however, at any time, only one of the two units will listen on the IP address. The Default Gateway of the Clients on the LAN should be set to the virtual IP value.
LAN Administration IP	This setting specifies a LAN IP address to be used for accessing administration functionality. This address should be unique within the LAN.
Subnet Mask	This setting specifies the subnet mask of the LAN.

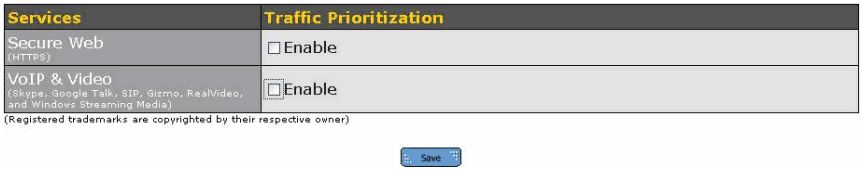
Important Note
Under HA mode, Dynamic DNS is not supported. During a fail-over or fail-back, the active PePLink Balance does not perform Dynamic DNS updates. As a result, the resolved addresses may not be the IP address of the active PePLink Balance unit.

15.2 Quality of Service

(This section applies only to PePLink Balance 200, 300 and 700.)

PePLink Balance provides the functionality to prioritize Secure Web, Voice over IP, and Video traffic over the other Internet traffic (e.g. Vonage, Skype, Google Talk, SIP, RealVideo, Windows Streaming Media, etc.).

The settings for configuring Quality of Service are located at the following location: ***Advanced Setup > Misc. Settings > Quality of Service***:

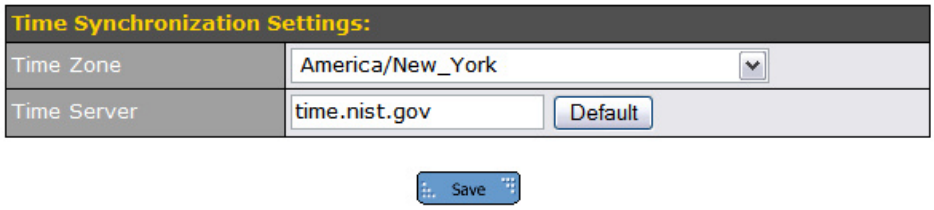


Quality of Service Settings	
Secure Web	This setting enables prioritized secure web traffic (i.e. HTTPS).
VoIP & Video	This setting enables prioritized Voice over IP and video traffic.

15.3 Time Server

The Time Server functionality enables the system clock of PePLink Balance to be synchronized with a specified Time Server.

The settings for Time Server configuration are located at the following location: ***Advanced Setup > Misc. Settings > Time Server***:

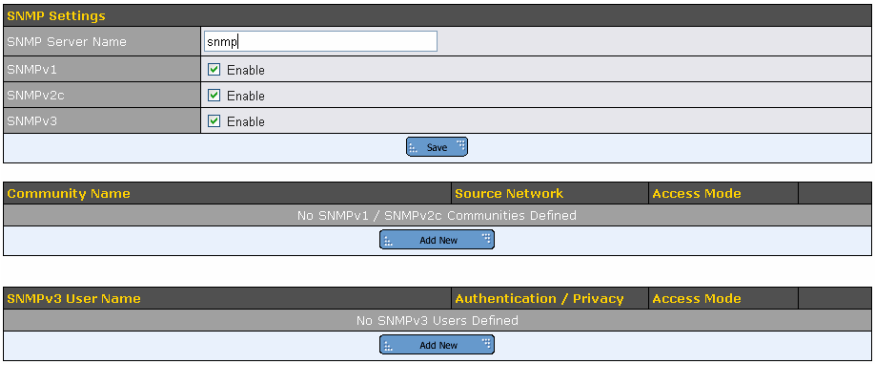


Time Server Settings	
Time Zone	This specifies the time zone (along with the corresponding Daylight Savings Time scheme) in which PePLink Balance operates. The Time Zone value affects the time stamps in the system logs of PePLink Balance.
Time Server	This setting specifies the NTP network time server to be utilized by PePLink Balance.

15.4 SNMP Setup

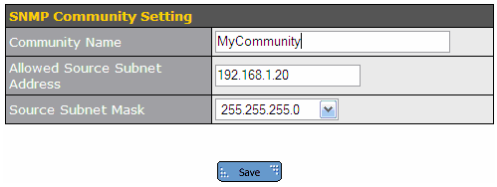
SNMP, or Simple Network Management Protocol, is an open standard that can be used to collect information about the PePLink Balance unit.

SNMP configuration is located at ***Advanced Setup > Misc. Settings > SNMP Setup***:



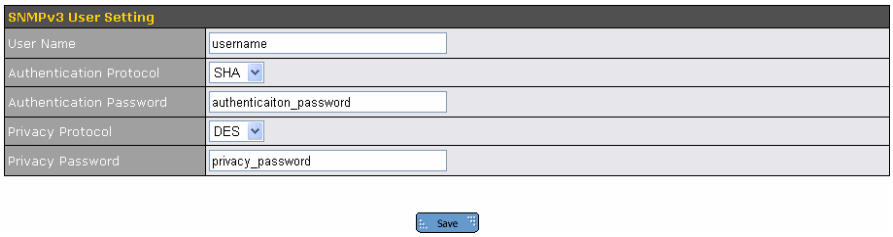
SNMP Settings	
SNMP Server Name	This setting specifies the SNMP server name.
SNMPv1	This setting specifies that SNMP version 1 is to be enabled.
SNMPv2c	This setting specifies that SNMP version 2 is to be enabled.
SNMPv3	This setting specifies that SNMP version 3 is to be enabled.

To add a community for either SNMPv1 or SNMPv2c, click the ***Add New*** button in the ***Community Name*** table, upon which the following screen is displayed:



SNMP Community Settings	
Community Name	This setting specifies the SNMP Community Name.
Allowed Source Subnet Address	This setting specifies a subnet from which access to the SNMP server is allowed. Enter subnet address here (e.g. `192.168.1.0`).
Source Subnet Mask	This setting specifies the subnet mask that corresponds to the subnet specified via Allowed Source Subnet Address (e.g. `255.255.255.0`).

To define a user name for SNMPv3, click ***Add New*** in the ***SNMPv3 User Name*** table, upon which the following screen is displayed:

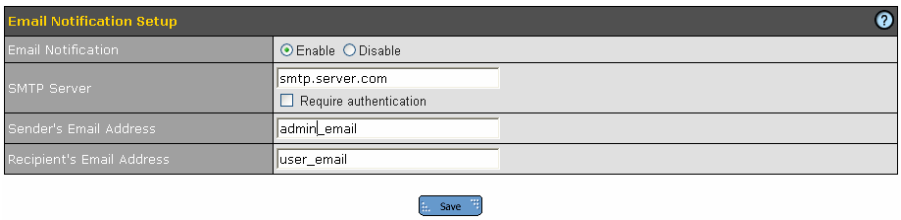


SNMPv3 User Settings	
User Name	This setting specifies a user name to be used in SNMPv3.
Authentication Protocol	This setting specifies via a drop-down menu the one of the following valid authentication protocols: • NONE • MD5 • SHA
Authentication Password	This setting specifies the authentication password, and is applicable only if the MD5 or SHA authentication protocol is selected.
Privacy Protocol	This setting specifies via a drop-down menu the one of the following valid privacy protocols: • NONE • DES
Privacy Password	This setting specifies the privacy password, and is applicable only if the DES privacy protocol is selected.

15.5 Email Notification

The Email Notification functionality of PePLink Balance provides a System Administrator with up-to-date information on network status.

The settings for configuring Email Notification are found at the following location: ***Advanced Setup > Misc. Settings > Email Notification***:



Email Notification Settings	
Email Notification	This setting specifies whether or not to enable Email Notification. If Email Notification is set to ***enable***, PePLink Balance sends email messages to a System Administrator when the WAN status changes, or when new firmware is available. If ***disable*** is set, PePLink Balance does not send email messages.
SMTP Server	This setting specifies the SMTP server to be used for sending email.
Sender's Email Address	This setting specifies the sender email address reported by the email messages sent by PePLink Balance.
Recipient's Email Address	This setting specifies the email address to which PePLink Balance should send the email messages.

15.6 Remote System Log

The Remote System Log functionality of PePLink Balance enables event logging at a specified remote Syslog server.

The settings for configuring Remote System Log are found at the following location: ***Advanced Setup > Misc. Settings > Remote Syslog***:

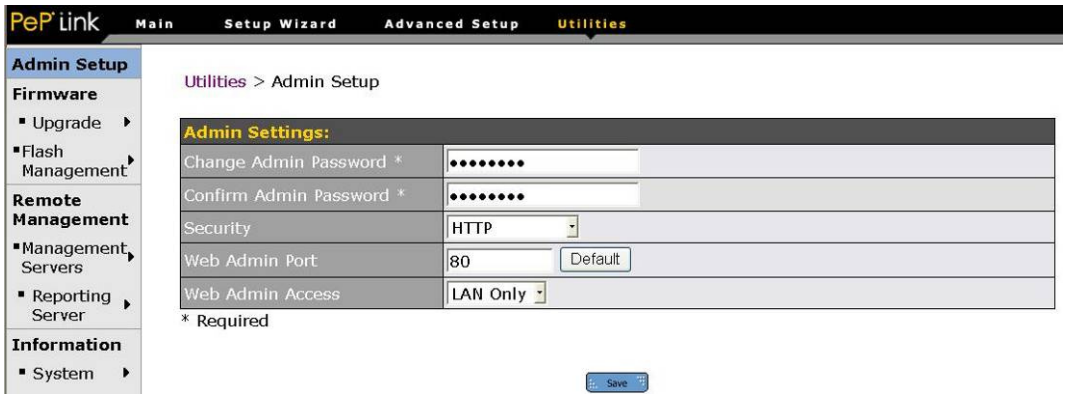
Remote Syslog Settings	
Remote Syslog	This setting specifies whether or not to log events at the specified remote Syslog server.
Remote Syslog Host	This setting specifies the IP address or hostname of the remote Syslog server.
Port	This setting specifies the port number of the remote Syslog service. By default, the Port setting has value is 514.

16 Administrative Settings

For security reasons, after logging in to the administration interface at the first time, changing the administrator password is recommended.

Configuring the administration interface to be accessible only from the LAN can further improve system security.

Administrative Settings configuration is located at ***Utilities > Admin Setup***:



Admin Settings	
Change Admin Password	This setting specifies a new administrator password.
Confirm Admin Password	This setting verifies and confirms the new administrator password.
Security	This setting specifies the protocol(s) through which the Web Administration Interface is accessible: • HTTP • HTTPS • HTTP/HTTPS
Web Admin Port	This setting specifies the port number at which the Web Administration Interface is accessible.
Web Admin Access	This setting specifies the network interfaces through which the Web Administration Interface can be accessed: • LAN only • LAN and WAN

17 Firmware

17.1 Firmware Upgrade

The firmware of PePLink Balance is upgradeable through Web Administration Interface.

Firmware upgrade functionality is located at ***Utilities > Firmware > Upgrade***:

Click on the ***Check for firmware*** button to use online upgrade. With online upgrade, PePLink Balance checks online for new firmware; if new firmware is available, the firmware is automatically downloaded by PePLink Balance. The upgrade process will subsequently be automatically initiated.

If a new version of firmware was previously and manually obtained, click ***Browse*** to select the firmware file from the local computer, then click ***Upload*** to send the firmware to PePLink Balance. PePLink Balance will then automatically initiate the firmware upgrade process.

Firmware Upgrade Status

Status LED Information during firmware upgrade:

- OFF – Firmware upgrade in progress (DO NOT disconnect power.)
- Red – Unit is rebooting
- Green – Firmware upgrade successfully completed

Important Note

The firmware upgrade process may not necessarily preserve the previous configuration, and the behavior varies on a case-by-case basis. Consult the Release Notes for the particular firmware version.

Do not disconnect the power during firmware upgrade process.

Do not attempt to upload a non-firmware file, or a firmware file that is not qualified, or not supported, by PePLink Ltd.

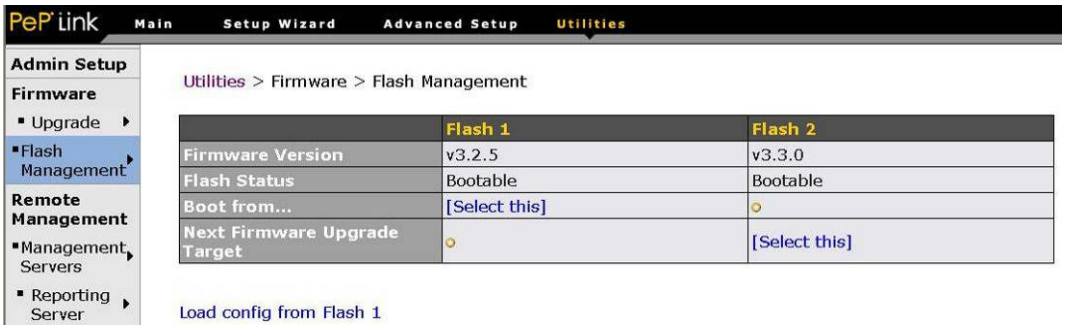
Upgrading a PePLink Balance unit with an invalid firmware file will damage the unit, and may void the warranty.

17.2 Flash Management

(This section applies only to PePLink Balance 30, 200 and 300.)

The PePLink Balance is equipped with dual flash memory modules. This feature not only allows improved flexibility but also facilitates more effective management of the flash contents. It is possible to upgrade the firmware on the flash that is not designated for booting, so that the boot flash is unaffected by firmware upgrade process or any potential power failures throughout.

Flash module management is located at ***Utilities > Firmware > Flash Management***:



Flash Management	
Firmware Version	This displays the firmware version on each flash module (i.e. ***Flash 1*** or ***Flash 2***)
Flash Status	This shows the status of the flash module.
Boot from…	The star indicates the flash module from which PePLink Balance will perform its next boot.
Next Firmware Upgrade Target	The star indicates the flash module that is the target of the next firmware upgrade. By default, the target of the next firmware upgrade is the flash module that is NOT designated for the next boot.

By clicking ***Load config from Flash X***, the configuration parameters on the corresponding flash module is loaded, but not activated. (***X*** corresponds to the flash module that is NOT designated for the next boot.) For example, clicking ***Load config from Flash 1*** loads the configuration from Flash 1, but does not activate the corresponding settings.

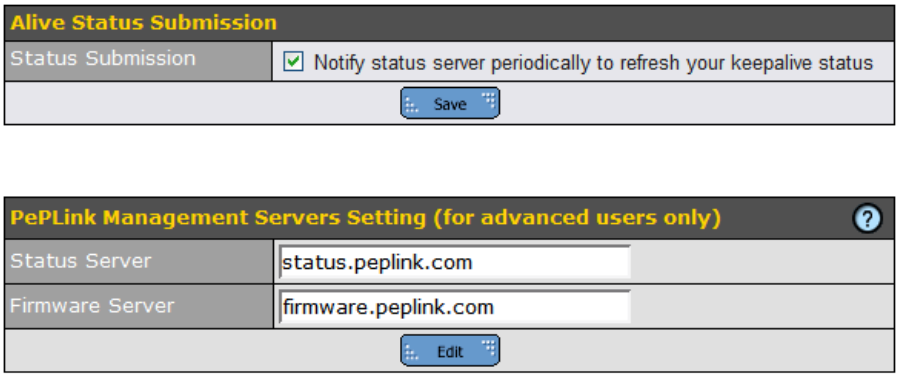
The configuration parameters are activated upon clicking ***Activate*** from the main menu of Web Administration Interface.

18 Remote Management

18.1 Management Servers

The PePLink Balance provides functionality to be remotely managed via remote management servers.

The settings for Remote Management are located at ***Utilities > Remote Management***:



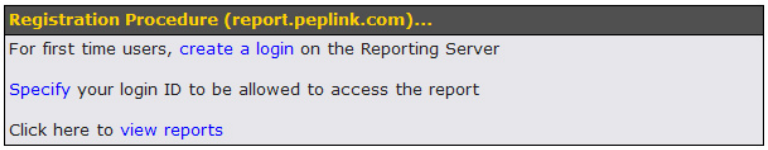
Alive Status Submission	
Status Submission	If the check box is checked, the PePLink Balance will send "alive" packets every hour to PePLink's headquarters for its alive status and its firmware version. By default, the checkbox is checked.

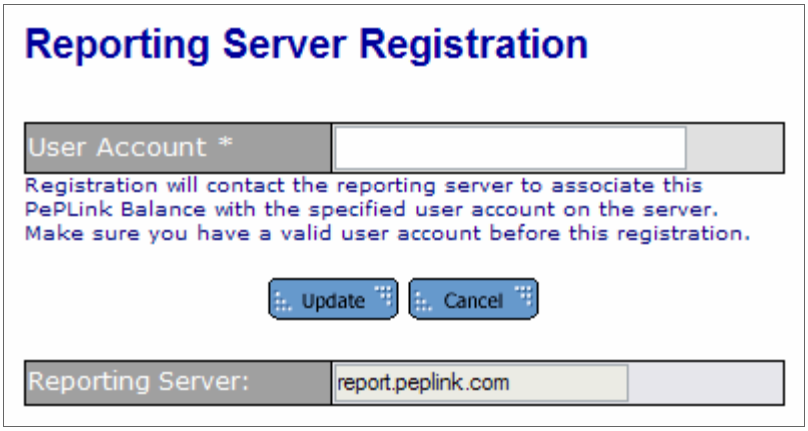
PePLink Management Servers Settings	
Status Server	This setting specifies the Internet IP address or hostname of the Status Server.
Firmware Server	This setting specifies the Internet IP address or hostname of the Firmware Server.

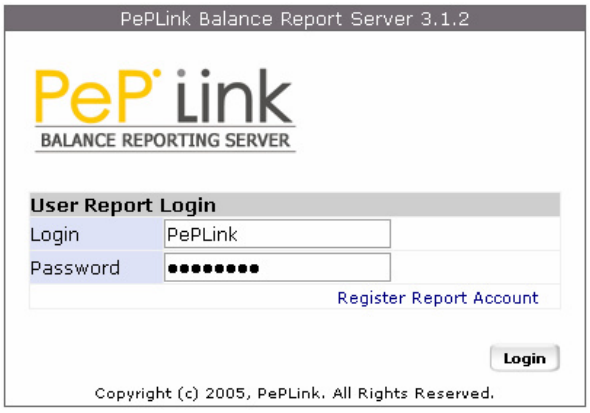
18.2 Reporting Server

The Reporting functionality enables PePLink Balance to post traffic data and other information periodically to a PePLink's Reporting Server. The server could dynamically generate historical usage reports of the device.

The settings for configuring Reporting Server functionality are found at the following location: ***Utilities > Remote Management > Reporting Server***:



Remote Reporting Settings	
Post Data to Server	This setting specifies whether or not PePLink Balance should periodically and automatically post traffic data to reporting server.
Reporting Server	This setting specifies the Internet IP address or hostname of the reporting server. By default, the Reporting Server value is report.peplink.com.
"create a login"	Click the link to register a login ID on PePLink's Reporting Server. Each login ID can associate with multiple PePLink Balance devices. If you already have a login ID on the server, you can skip this step.
"Specify"	Click on the link and the following window will pop up:  Fill in the "User Account" field to specify the login ID on the Reporting Server to be allowed to access the report of this PePLink Balance device.

"view reports"	Click the link to view link usage reports from the Reporting Server. A login screen should be shown: 

Important Note

The registration process will contact the reporting server to associate the PePLink Balance unit with the specified user account on the server.

Please ensure prior to registration that the user account that is entered is valid.

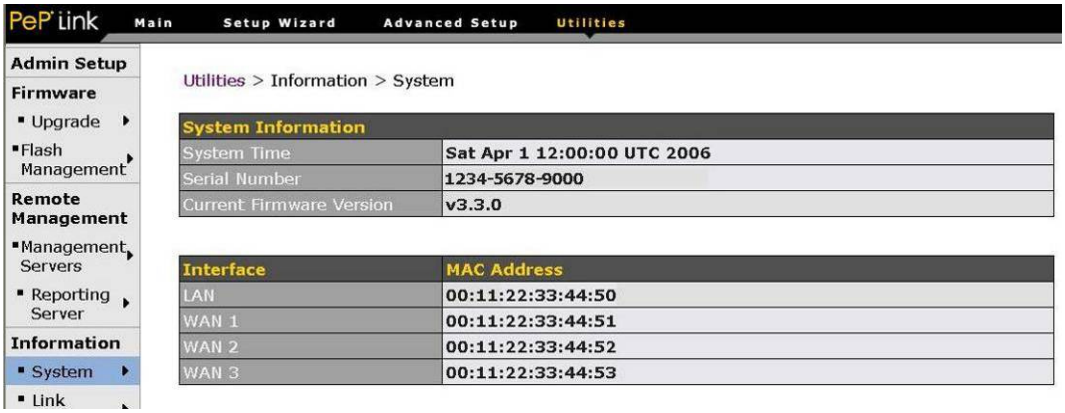
19 Information

The information section displays the information of PePLink Balance on system, link usage, active session, and log.

The Information functionality is located at ***Utilities > Information***.

19.1 System

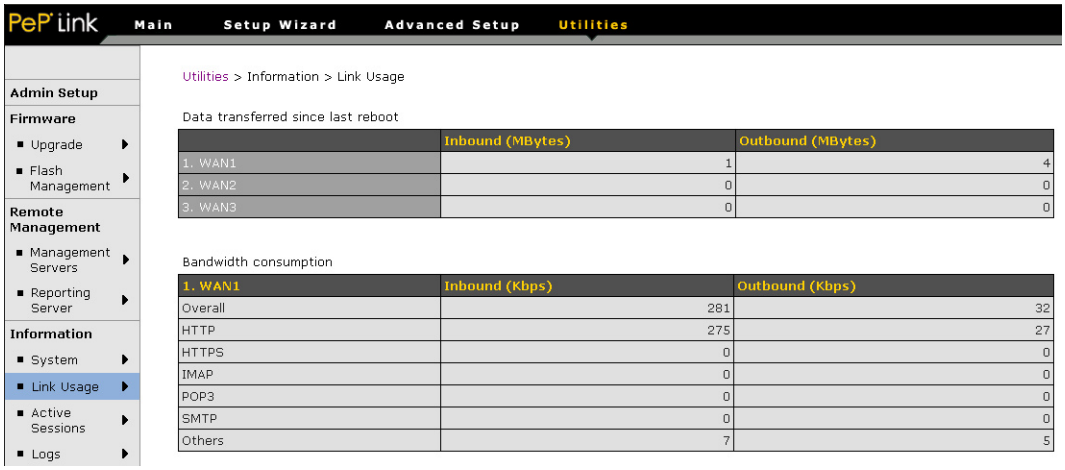
System information is located at ***Utilities > Information > System***:



System Information	
System Time	This shows the current system time.
Serial Number	This shows the serial number of the PePLink Balance unit.
Current Firmware Version	This shows the firmware version on which the PePLink Balance unit is currently running.

19.2 Link Usage Status

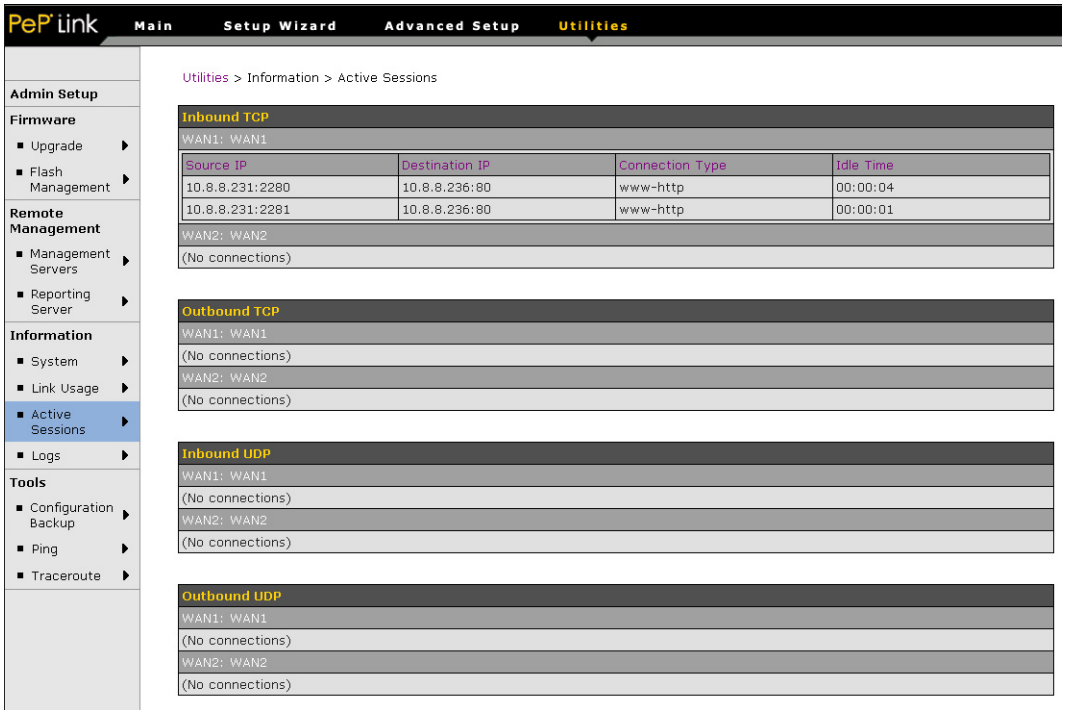
Link usage status information is located at ***Utilities > Information > Link Usage***:



The Link Usage Status section displays the cumulative amounts of data that have been transferred through each WAN link, as well as the inbound and outbound rate of data transferred via various protocols.

19.3 Active Sessions

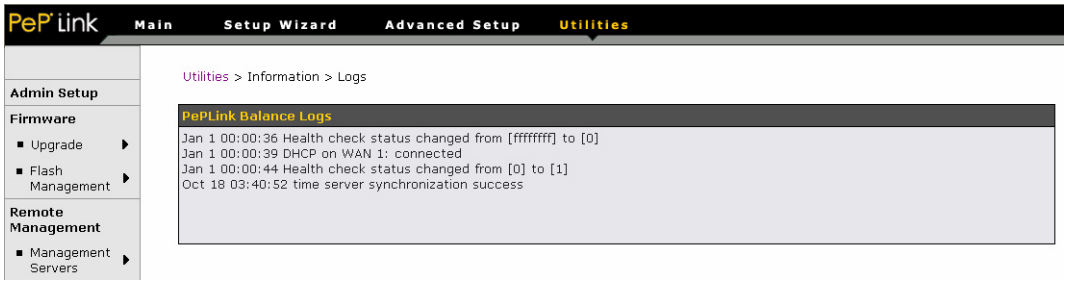
Information on Active Sessions is at ***Utilities > Information > Active Sessions***:



This Active Sessions section displays the active inbound and outbound, UDP and TCP sessions of each WAN connection on PePLink Balance.

19.4 Log

Log information is located at ***Utilities > Information > Logs***:



The log section displays a list of events that has taken place on the PePLink Balance unit.

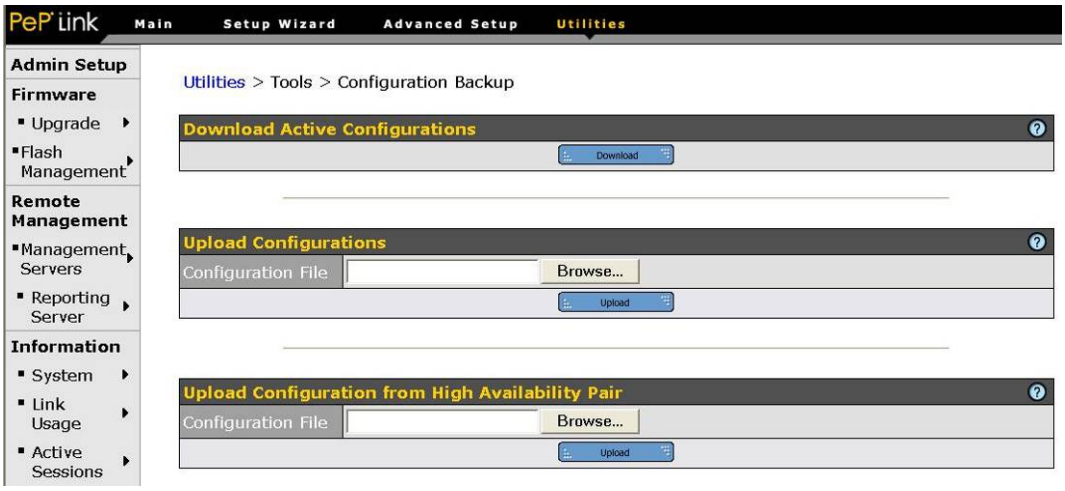
20 Utilities

Utilities are provided by Web Administration Interface to ease the tasks of configuration backup, network diagnostic and performance analysis.

20.1 Saving and Loading Configurations

Backing up the PePLink Balance settings immediately after the successful completion of the initial setup is strongly recommended.

The functionality to download and upload PePLink Balance settings is found at the following location: ***Utilities > Tools > Configuration Backup***:



20.1.1 Downloading Active Configurations

To backup the current settings, click ***Download*** and save the configuration file.

20.1.2 Uploading Configurations

To restore or change settings based on a configuration file, click ***Browse*** to locate the configuration file on the local computer, and then click ***Upload***.

The new settings can then be activated, or discarded, at the Main page of Web Administration Tool via the ***Activate*** or ***Discard*** buttons, respectively.

20.1.3 Uploading Configuration from High Availability Pair

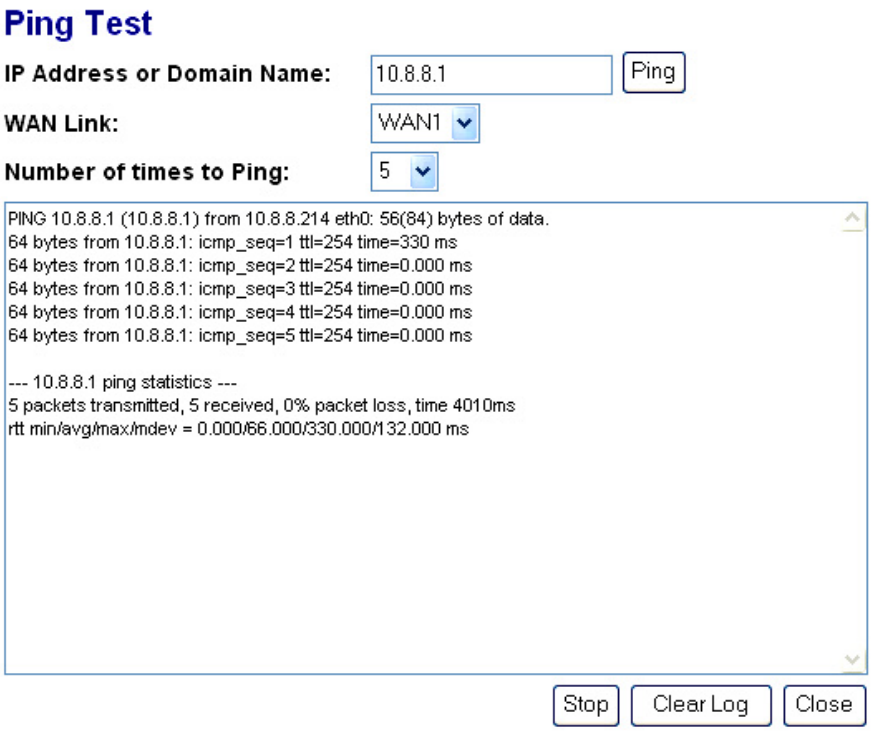
In a High Availability (HA) configuration, to quickly load onto the PePLink Balance unit the configuration of its HA counterpart, click the ***Upload*** button.

After loading the settings, configure the LAN IP address of the PePLink Balance unit to be different from the HA counterpart.

20.2 Ping Test

The Ping Test tool in PePLink Balance performs Pings through a specified LAN/WAN link.

The Ping utility is located at ***Utilities > Tools > Ping***. The Ping utility is displayed as a pop-up window, illustrated as follows:

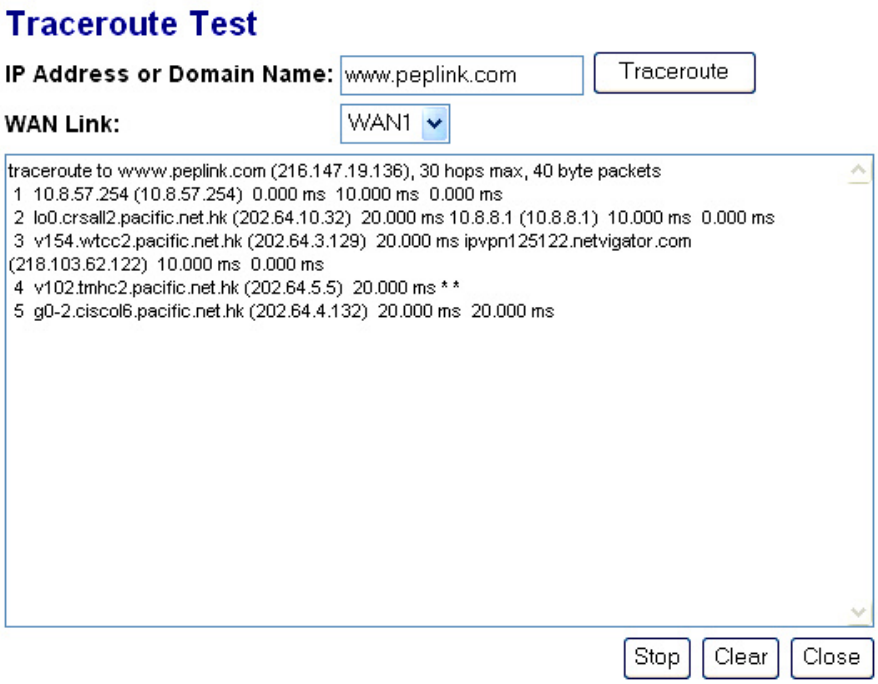

Ping Test
IP Address or Domain Name:
10.8.8.1
Ping
WAN Link:
WAN1
Number of times to Ping:
5
PING 10.8.8.1 (10.8.8.1) from 10.8.8.214 eth0: 56(84) bytes of data.
64 bytes from 10.8.8.1: icmp_seq=1 ttl=254 time=330 ms
64 bytes from 10.8.8.1: icmp_seq=2 ttl=254 time=0.000 ms
64 bytes from 10.8.8.1: icmp_seq=3 ttl=254 time=0.000 ms
64 bytes from 10.8.8.1: icmp_seq=4 ttl=254 time=0.000 ms
64 bytes from 10.8.8.1: icmp_seq=5 ttl=254 time=0.000 ms
--- 10.8.8.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4010ms
rtt min/avg/max/mdev = 0.000/66.000/330.000/132.000 ms
Stop
Clear Log
Close

Tip
A System Administrator can use the Ping utility to manually check the connectivity of a particular LAN/WAN link.

20.3 Traceroute Test

The Traceroute Test tool in PePLink Balance traces the routing path to the destination through a particular LAN/WAN link.

The Traceroute Test utility is located at ***Utilities > Tools > Traceroute***. The Traceroute Test utility is displayed as a pop-up window, illustrated as follows:


Traceroute Test
IP Address or Domain Name:
www.peplink.com
Traceroute
WAN Link:
WAN1
traceroute to www.peplink.com (216.147.19.136), 30 hops max, 40 byte packets
1 10.8.57.254 (10.8.57.254) 0.000 ms 10.000 ms 0.000 ms
2 lo0.crsall2.pacific.net.hk (202.64.10.32) 20.000 ms 10.8.8.1 (10.8.8.1) 10.000 ms 0.000 ms
3 v154.wtcc2.pacific.net.hk (202.64.3.129) 20.000 ms ipvpn125122.netvigator.com
(218.103.62.122) 10.000 ms 0.000 ms
4 v102.tmhc2.pacific.net.hk (202.64.5.5) 20.000 ms * *
5 g0-2.ciscol6.pacific.net.hk (202.64.4.132) 20.000 ms 20.000 ms
Stop
Clear
Close

Tip
A System Administrator can use the Traceroute utility to analyze the connection path of a LAN/WAN link.

Appendix A. Restoration of Factory Defaults

To restore the factory default settings on a PePLink Balance unit, perform the following:

For Balance 30/200/300:

1. Locate the reset button at the back of the PePLink Balance unit.
2. With a paper clip, press and keep the reset button pressed for at least 5 seconds, until the unit reboots itself.

For Balance 700:

- Use the buttons to control the LCD menu to go to "Maintenance" --> "Factory Default". Then choose "Yes" to confirm.

Afterwards, the factory default settings will be restored.

Important Note
All user settings will be lost after restoring the factory default settings. Regular backup of configuration parameters are strongly recommended.

Appendix B. Routing under DHCP, Static IP, and PPPoE

The information in this appendix applies only to situations where PePLink Balance operates with to a WAN link under DHCP, Static IP, and PPPoE.

For information that applies to GRE, please refer to:

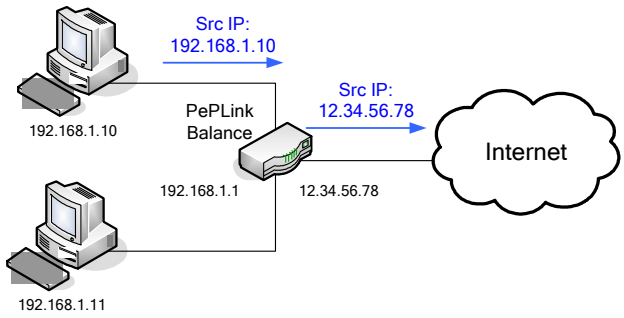
- Section 10.4.1, **Routing under GRE via Network Address Translation (NAT)**
- Section 10.4.2, **Routing under GRE via IP Forwarding**

B.1 Routing via Network Address Translation (NAT)

When PePLink Balance is operating under NAT mode, the source IP addresses of outgoing IP packets are translated to the WAN IP address of PePLink Balance. Therefore, with NAT, all LAN devices share the same WAN IP address to access the Internet (i.e. the WAN IP address of PePLink Balance).

Operating PePLink Balance in NAT mode requires only one WAN (Internet) IP address. In addition, operating in NAT mode also has security advantages because LAN devices are hidden behind PePLink Balance, not directly accessible from the Internet, and, hence, less vulnerable to attacks.

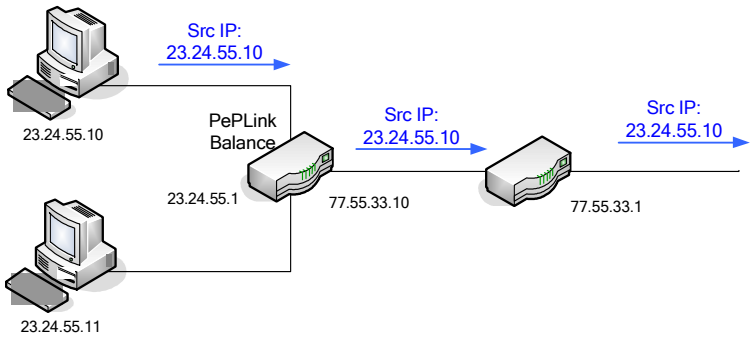
The following figure shows the packet flow in NAT mode:



B.2 Routing via IP Forwarding

When PePLink Balance is operating under IP Forwarding mode, the IP addresses of IP packets are unchanged; PePLink Balance forwards both inbound and outbound IP packets without changing their IP addresses.

The following figure shows the packet flow in IP Forwarding mode:



Appendix C. Case Studies

C.1 Performance Optimization

C.1.1 Scenario

In this scenario, email and web browsing are the two main Internet services used by the LAN users.

The mail server is external to the network.

The links are ADSL (with slow uplink and fast downlink) and Metro Ethernet (symmetric).

C.1.2 Solution

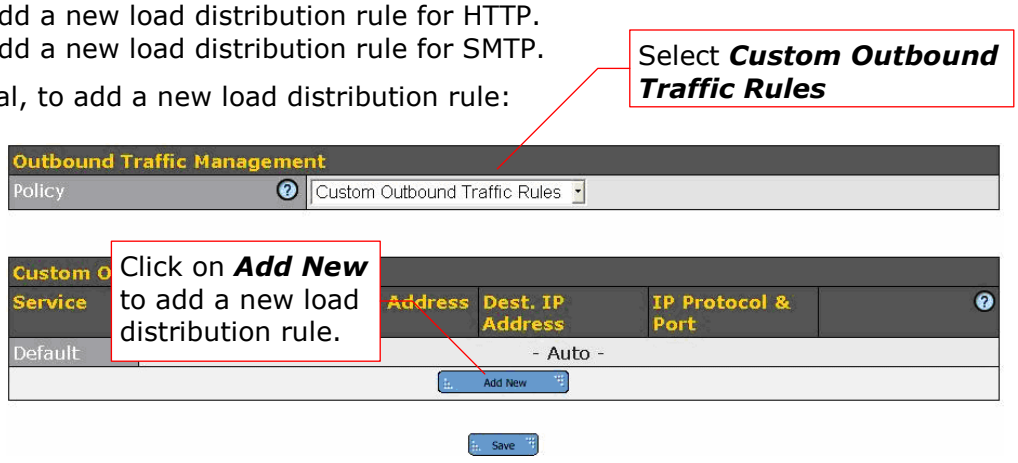
The solution is to individually set the WAN loading balance according to the service.

- Web browsing mainly downloads data; sending e-mails mainly consumes upload bandwidth.
- Both links offer good download speeds; WAN2 offers good upload speeds.
- Define WAN1 and WAN2's inbound and outbound bandwidths to be 3M/512k and 4M/4M respectively.
- For HTTP, set the weight to 3 : 4.
- For SMTP, set the weight to 1 : 8, such that users will have a greater chance to be routed via WAN2 when sending e-mail.

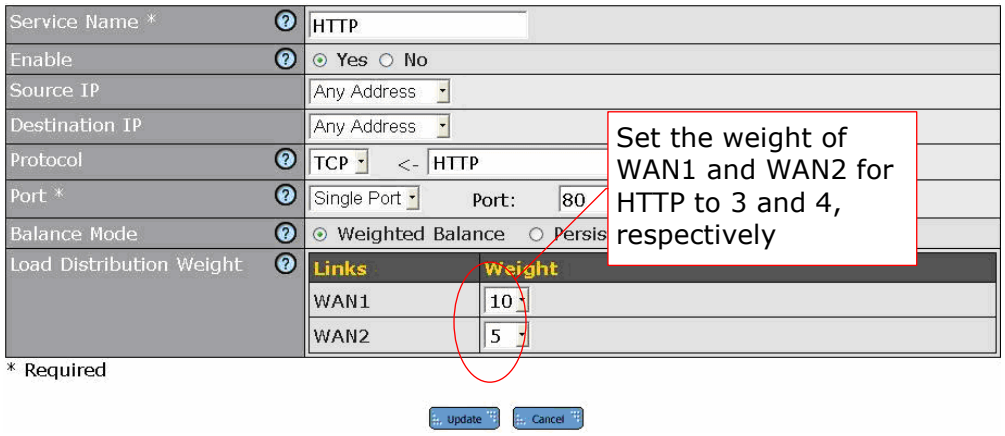
C.1.3 Settings

1. Add a new load distribution rule for HTTP.
2. Add a new load distribution rule for SMTP.

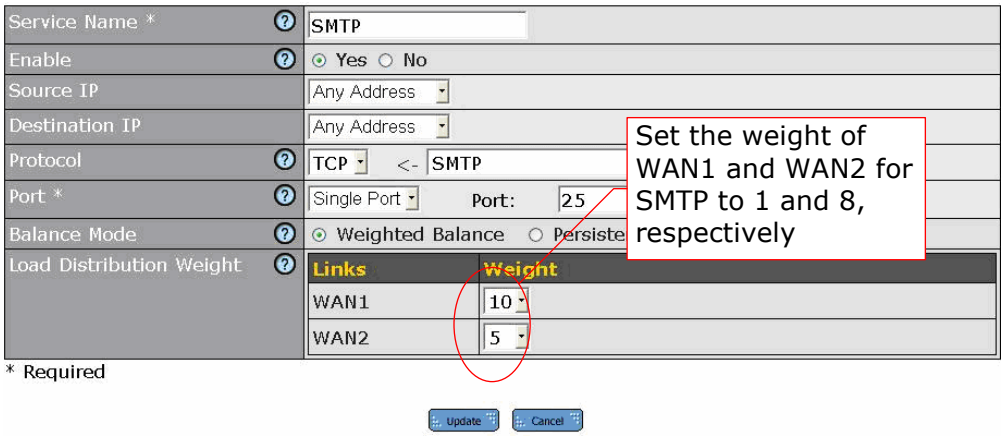
In general, to add a new load distribution rule:



Settings for HTTP:



Settings for SMTP:



C.2 Maintaining the Same IP Address throughout a Session

C.2.1 Scenario

Some client IP address sensitive web sites (for example, Internet banking) use both client IP address and cookies matching for session identification. Since different IP addresses are used during the load balancing, the session is dropped when a mismatching IP is detected.

C.2.2 Solution

Make use of the Persistency functionality of PePLink Balance.

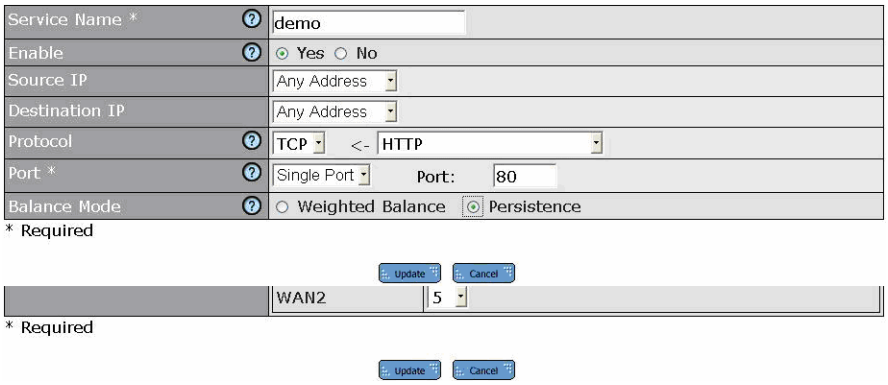
With Persistency appropriately configured, PePLink Balance uses a consistent WAN link for source-destination pairs of IP addresses, and prevents sessions from being dropped.

C.2.3 Settings

Set persistence in:

Advanced Setup > Outbound Traffic Management > Custom Outbound Traffic Rules

Click ***Add New***, select ***HTTP*** (TCP port 80) for web service, and select ***Persistence***.



Tip

A System Administrator can use the Traceroute utility to manually analyze the connection path of a particular WAN link.

C.3 Bypassing the Firewall to Access Hosts on LAN

C.3.1 Scenario

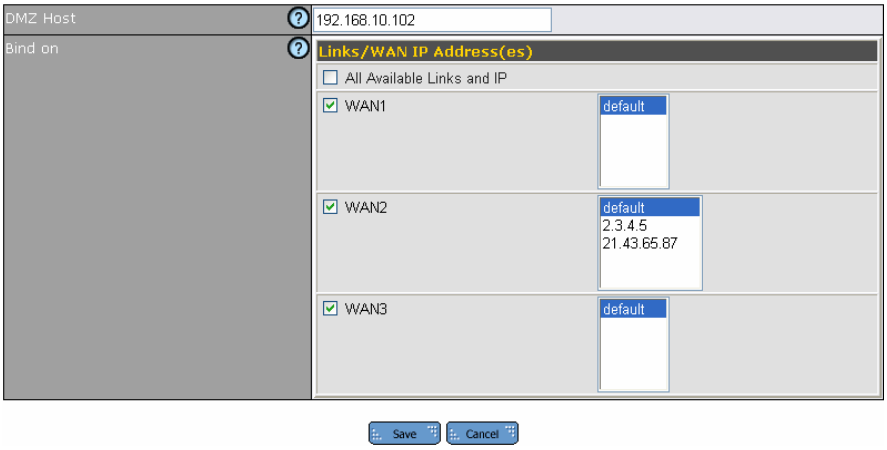
There are times when remote access to computers on the LAN is desirable; for example, when hosting web sites, online businesses and FTP download and upload areas, etc.

In such cases, it may be appropriate to create a DMZ (Demilitarized Zone) for the network to allow some hosts on the LAN to be accessible from outside of the firewall.

C.3.2 Solution

Web Administration Interface can be used for adding a host to the DMZ and to bind the host to the WAN links, via ***Advanced Setup > DMZ Servers > Add/Edit DMZ Server***

For example, the following settings add the host, with IP address 192.168.10.102, to the DMZ and bind the host to all of the available WAN links:



C.4 Inbound Access Restriction

C.4.1 Scenario

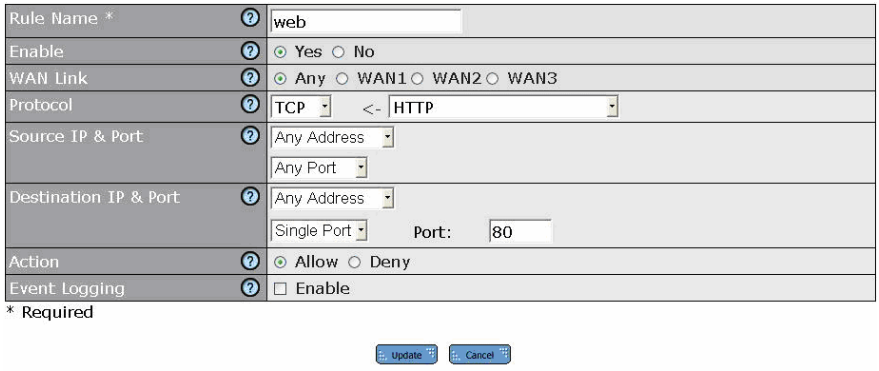
A firewall is required in order to protect the network from potential hacker attacks and other Internet security threats.

C.4.2 Solution

Firewall functionality is built into PePLink Balance. By default, inbound access is unrestricted.

Enabling a basic level of protection involves setting up firewall rules.

For example, to set up a firewall rule between the Internet and the private network that monitors Web access from Internet, make the settings according the following screenshot at ***Advanced Setup >Firewall >Inbound > Add/Edit Inbound Rule***:



After the fields have been entered as in the screenshot, click ***Update*** to add the rule.

Then set the rule as a default rule in:
Advanced Setup ->Firewall ->Inbound -> Default Inbound Rule

C.5 Outbound Access Restriction

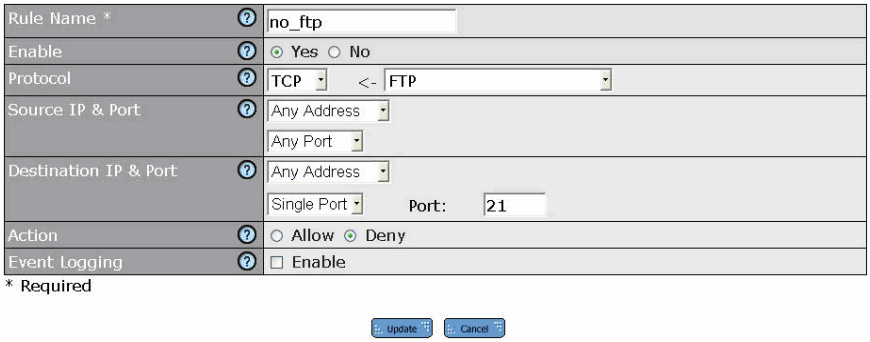
C.5.1 Scenario

For security reasons, it may be appropriate to disallow LAN users to use ftp to transfer files to and from the Internet, or otherwise restrict outbound access.

This can easily be achieved by setting up an outbound firewall rule with PePLink Balance.

C.5.2 Solution

To set up a firewall between Internet and private network for outbound access, make the settings according the following screenshot at:
Advanced Setup > Firewall > Outbound > Add/Edit Outbound Rule:



After the fields have been entered as in the screenshot, click ***Update*** to add the rule.

Then set the rule as a default rule in:
Advanced Setup >Firewall >Outbound > Default Outbound Rule

Appendix D. Troubleshooting

Problem 1

Outbound load is only distributed taking place over one WAN link.

Solution

Outbound load can only be distributed evenly to the WAN link if many outbound connections are made. If there is only one user on the LAN and only one download session is made from his/her browser, the WAN links cannot be fully utilized.

For a single user, download manager applications are recommended. The applications can split a file into pieces and download the pieces simultaneously. For example: FlashGet (Windows), GetRight (Windows), iGetter (MAC), etc.

Problem 2

I am using FlashGet now. Why is the download speed still in single link's speed?

Solution

First, check whether the WAN links are up.

Second, ensure your download manager application has split the file into 3 parts or more.

It is also possible that all of 2 or even 3 download sessions were being distributed to the same link by chance.

Problem 3

I am using some web sites to lookup my public IP address, e.g. www.whatismyip.com. When I keep pressing the browser's Refresh button, the server almost always returns the same address. The IP address supposed to be changing for every refresh

Solution

The web server has enabled the "Keep Alive" function such that you were using the same TCP session to query the server.

Try to test with a web site that does not enable "Keep Alive".

For example, try `http://www2.simflex.com/ip.shtml` (This third-party web site is provided only for reference. PePLink has no association with the site and does not guarantee the site's validity or availability.)

Problem 4

What can I do if I suspect a problem on my LAN connection?

Solution

You can test the LAN connection using "ping".

For example, if you are using DOS/Windows, at the Command Prompt, type:

```
ping 192.168.1.1
```

This pings the PePLink Balance device (provided that PePLink Balance device's IP is 192.168.1.1) to test whether the connection to PePLink Balance is OK.

Problem 5

What can I do if I suspect a problem on my Internet/WAN connection?

Solution

You can test the WAN connection by "ping", which is similar to problem 4.

As we want to isolate the problems from the LAN, "ping" will be performed from PePLink Balance. By using the Ping/Traceroute utilities of PePLink Balance, you may able to find out the source of problem.

Problem 6

When I upload files to a server via ftp, the transfer stalls after a few kilobytes of data are sent. What should I do?

Solution

The Maximum Transmission Unit (MTU) or MSS setting may need to be adjusted.

By default, the MTU is set at 1500. For most DSL users, it is strongly recommended to use MTU 1492. If problem persists, change the size to smaller values until your problem is solved (e.g. 1462, 1420, 1400).

Appendix E. Product Specifications

E.1 PePLink Balance 200

Routing

- NAT and IP Forwarding
- Configurable Static Routes

WAN Support

- DHCP, PPPoE, GRE, and Static IP
- Inbound and Outbound Link Load Balance

Device Management

- Wizard & Menu Driven Web-based Administration Interface over HTML SSL
- Remote Reporting and Management
- Configurations Upload and Download

Internet Access Sharing

- SUA (Single User Account) / Multi-to-Multi NAT
- NAT supports PAT (Port Address Translation)

Security

- Compatible with IPSec and PPTP VPN
- Rules-based Stateful Firewall, with IP Address, Protocol and Port filtering
- DMZ (Demilitarized Zone)

Physical Interface

- Two RJ-45 for an IEEE 802.3u 10/100M WAN
- Four RJ-45 for an IEEE 802.3u 10/100M LAN
- RS-232 Console / Serial (modem / TA) Port

Power Specification

- AV Input 100-240V, DC Output 9V

Operating Environment

- Kensington Lock Interface
- Temperature: 0°C - 50°C
- Humidity: 10% - 90% (non-condensing)

E.2 PePLink Balance 30 and PePLink Balance 300

Routing

- NAT and IP Forwarding
- Configurable Static Routes

WAN Support

- DHCP, PPPoE, GRE, and Static IP
- Inbound and Outbound Link Load Balance

Device Management

- Wizard & Menu Driven Web-based Administration Interface over HTML SSL
- Remote Reporting and Management
- Configurations Upload and Download

Internet Access Sharing

- SUA (Single User Account) / Multi-to-Multi NAT
- NAT supports PAT (Port Address Translation)

Security

- Compatible with IPSec and PPTP VPN
- Rules-based Stateful Firewall, with IP Address, Protocol, and Port filtering
- DMZ (Demilitarized Zone)

Physical Interface

- Three RJ-45 for an IEEE 802.3u 10/100M WAN
- Four RJ-45 for an IEEE 802.3u 10/100M LAN
- RS-232 Console / Serial (modem / TA) Port

Power Specification

- AC Input 100-240V, DC Output 9V

Operating Environment

- Kensington Lock Interface
- Temperature: 0°C - 50°C
- Humidity: 10% - 90% (non-condensing)

E.3 PePLink Balance 700

Routing

- NAT and IP Forwarding
- Configurable Static Routes

WAN Support

- DHCP, PPPoE, GRE, and Static IP
- Inbound and Outbound Link Load Balance

Device Management

- Wizard & Menu Driven Web-based Administration Interface over HTML SSL
- Remote Reporting and Management
- Configurations Upload and Download

Internet Access Sharing

- SUA (Single User Account) / Multi-to-Multi NAT
- NAT supports PAT (Port Address Translation)

Security

- Compatible with IPSec and PPTP VPN
- Rules-based Stateful Firewall, with IP Address, Protocol, and Port filtering
- DMZ (Demilitarized Zone)

Physical Interface

- Four RJ-45 for an IEEE 802.3u 10/100M WAN
- Three RJ-45 for an IEEE 802.3u 10/100/1000M WAN
- One RJ-45 for an IEEE 802.3u 10/100/1000M LAN
- RS-232 Console / Serial (modem / TA) Port

Power Specification

- AC input 110/220V

Operating Environment

- Temperature: 0°C - 40°C
- Humidity: 10% - 90% (non-condensing)

Support

Email: support@peplink.com

SALES

Email: sales@peplink.com

BUSINESS DEVELOPMENT AND PARTNERS

Email: partners@peplink.com
Email: busdev@peplink.com

PUBLIC RELATIONS

Email: pr@peplink.com

CORPORATE ADDRESS & PHONE

Address:
PePLink Ltd
2302-3, 23/F,
Tai Tung Building,
8 Fleming Road,
Wanchai, Hong Kong
URL: http://www.peplink.com
Tel: +852-2786-9228
Fax: +852-3007-0588

PeP link

Copyright © 1999-2006 PePLink Ltd. All Rights Reserved.